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UNITED STATES PACIFIC FLEET AND PACIFIC OCEAN AREAS

JAPANESE DELIBERATE FIELD FORTIFICATIONS

SPECIAL TRANSLATION NUMBER 58

CINCPAC - CINCPOA
BULLETIN NO. 94 - 45
20 MAY 1945

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UNITED STATES PACIFIC FLEET
AND PACIFIC OCEAN AREAS
HEADQUARTERS OF THE COMMANDER IN CHIEF

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25 April 1945 - Serial BIS-251530

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CINCPAC-CINCPOA SPECIAL TRANSLATION NO. 58

Item #10,[illegible]

JAPANESE DELIBERATE FIELD FORTIFICATIONS
undated, captured on SAIPAN.

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EDITOR'S NOTE

This is the most comprehensive set of deliberate field fortification layouts and specifications that has been found to date. Some of the diagrams in this set have appeared in previous publications, supplemented by photographs, sketches, and comments. (In particular, see JICPOA Bulletin #71-44, Japanese Military Installations, 15 June 1944, with Supplement of 25 Sept. 1944. CINCPAC-CINCPOA Special Translation #59, Heavy DP Gun Emplacements, 100mm Type 98, 120mm Type 10 contains supplementary material. For detailed information supplementing the section on AA Installations, consult CINCPAC-CINCPOA Special Translation #62.)

Translations of captured fortification plans issued by area forces have also been published. (GILBERTS: JICPOA Item #3769, Standard Japanese Field Fortifications -- Selected; MARSHALLS: JICPOA Items #8056, Permanent Fortifications, and #6365, Information On Obstacles Used To Impede Landing Craft and Amphibious Vehicles -- 4th Fleet Planning Section; also JICPOA Items #7785, Special Fire Points, Covered Rifle and Gun Emplacements, and #7723, Notes on Beach Obstacles -- 1st Amphibious Brigade; MARIANAS: JICPOA Item #9535F, Plans For Construction of Dummy Batteries On GUAM -- MARIANAS Grp Hq.)

In addition ATIS has published similar reports covering the Southwest Pacific Areas, and Part I of the Japanese Infantry Field Fortification Manual (Enemy Publication #50, 23 Oct. 1943). Further information on fortifications may be found in published Defense Plans of OGASAWARA, PALAU, the MARIANAS, etc.

To a large degree all have been adaptations to local conditions of plans in this set, with emphasis on the use of on-the-spot materials. The Japanese, in fortifying their more remote territories, lacked materials to construct the elaborate installations called for in some of these plans. However, reconnaissance photographs and the experience of recent operations would seem to indicate that we shall, in the homeland, encounter deliberate fortifications which are up to official specifications. Cut-and-cover fortifications will be dug deeper than indicated herein; and/or their walls and ceilings will be thicker. and/or bursting layers provided. Specifications captured on OKINAWA call for walls and ceilings 1.3 - 3.5 meters thick for MG Pillboxes. (Casemates for Rapid-fire Guns, 2 - 3.5 meters, for Regimental or Mountain Guns, 1.3 - 2 meters; Company Command Posts, 2 meters; Artillery Observation Posts, 1.3 meters; Open Emplacements for Rifles and MG, 1.3 meters.) Cave-type construction, with either open-cut or horizontal shaft, will undoubtedly be substituted whenever possible.

JICPOA L-50629-1 THRU 367

TABLE OF CONTENTS

I-OPEN EMPLACEMENTS

PAGE

II-PILLBOXES

III-CASEMATES

IV - FIRE PORTS

PAGE

V - GUN PLATFORMS

VI - READY SHELTERS

VII - OBSERVATION POSTS

VIII - COMMAND POSTS

IX - ANTI-AIRCRAFT INSTALLATIONS

X - OPEN COMMUNICATION TRENCHES

PAGE

XI - UNDERGROUND PASSAGEWAYS

XII - REVETMENTS

XIII - SEARCHLIGHT SHELTERS

XIV - CUT-AND-COVER SHELTERS FOR PERSONNEL

XV - UNDERGROUND SHELTERS

PAGE

XVI - /UNDERGROUND/ FIELD KITCHEN

XVII - PROVISIONS STOREHOUSES

XVIII - FUEL AND LUBRICANT STOREHOUSES

XIX - MAGAZINES

XX - FIELD DRESSING STATION

PAGE

XXI - RADIO STATIONS

XXII - UNDERWATER-SOUND DETECTION STATION

XXIII - BEACH OBSTACLES

XXIV - ANTI-TANK OBSTACLES

PAGE

XXV - CAMOUFLAGE

XXVI – LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

PAGE

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

PAGE

PAGE

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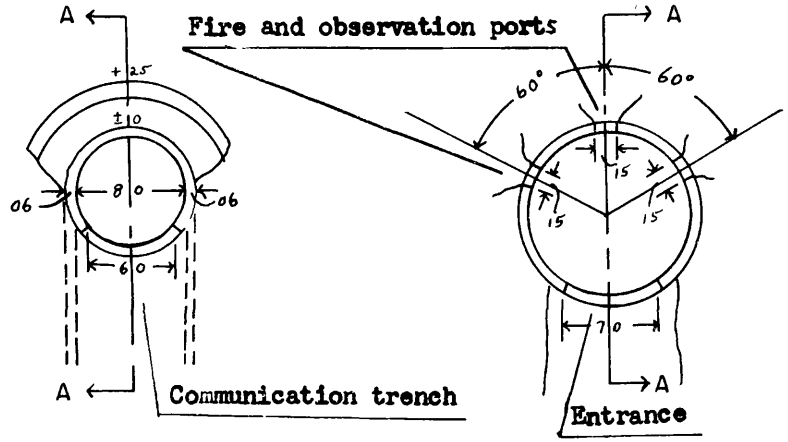
OPEN EMPLACEMENTS

RIFLE

PLAN CROSS SECTION

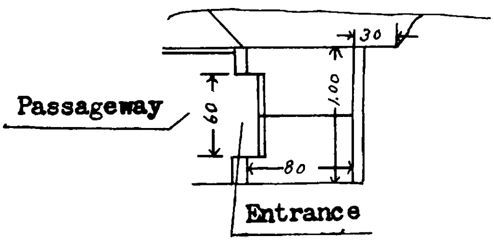
DUAL PURPOSE O.P. AND LMG (WITH LIGHT COVER)

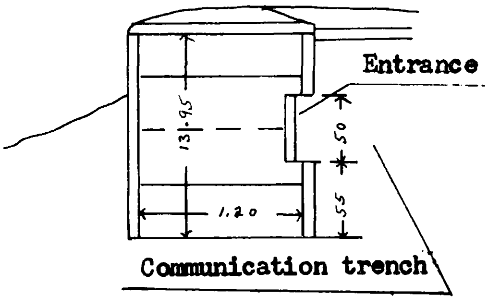
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SECTION A-A

SECTION A-A

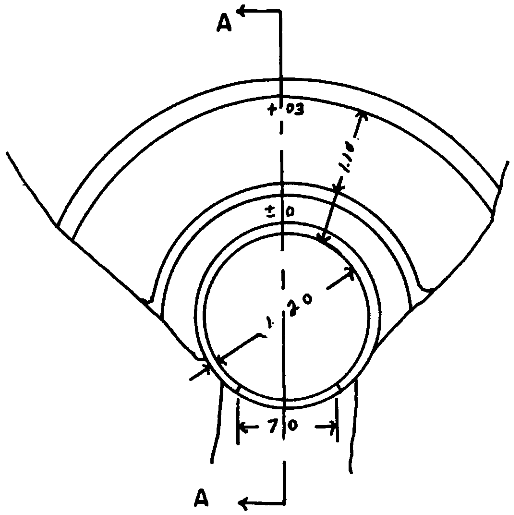




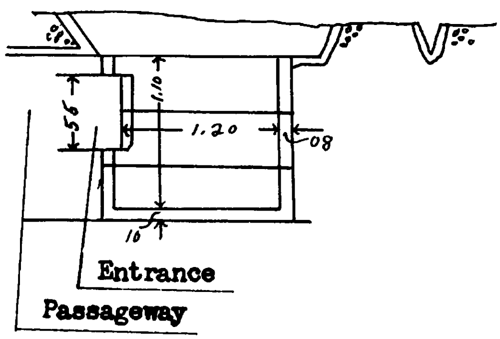
I - OPEN EMPLACEMENTS

LMG

PLAN, CROSS SECTION



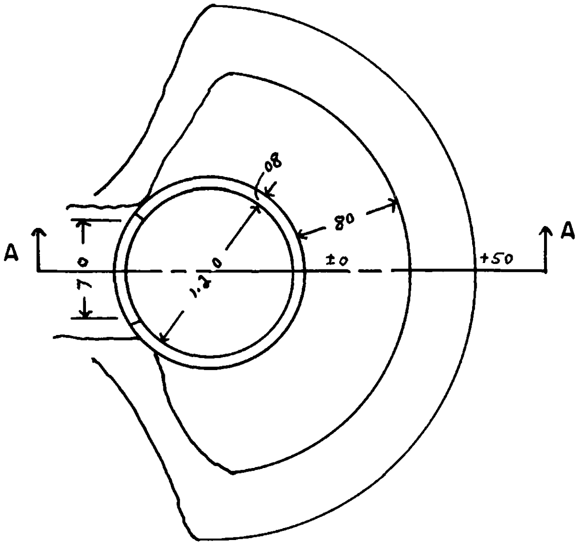
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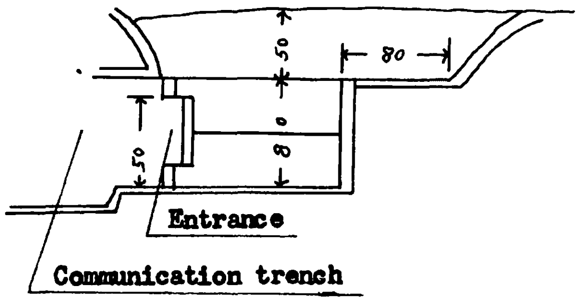
I - OPEN EMPLACEMENTS

GRENADE THROWER

PLAN CROSS SECTION



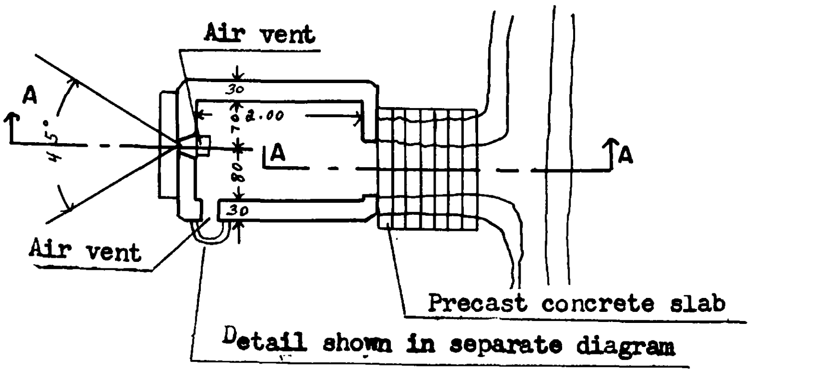
SECTION A-A



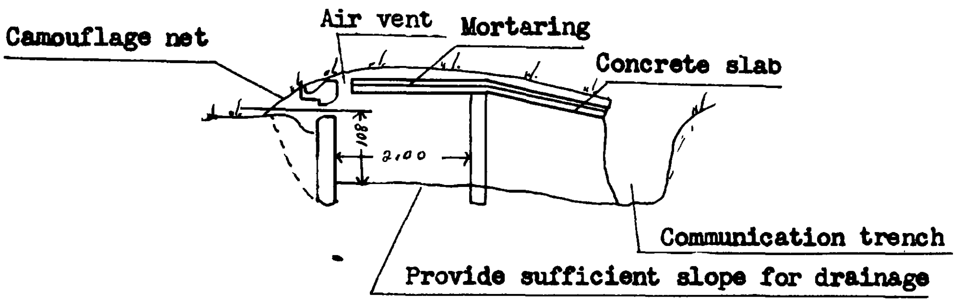
II - PILLBOXES

FOR ONE LMG

PLAN CROSS SECTION



SECTION A-A



Notes:

1. In this pillbox the 11th year type, Type 96, or Type 99 LMG equipped with telescopic sights may be used.
2. In the detailed diagram of the fire port the reinforcement is omitted.
3. Disposition of foundation and entrances should take into account factors of local terrain and soil.

List of Required Materials

Concrete..................55 cu m
Steel reinforcement...... 1 ton
Forms { inner............30 sq m
Forms { outer............25 sq m/?/

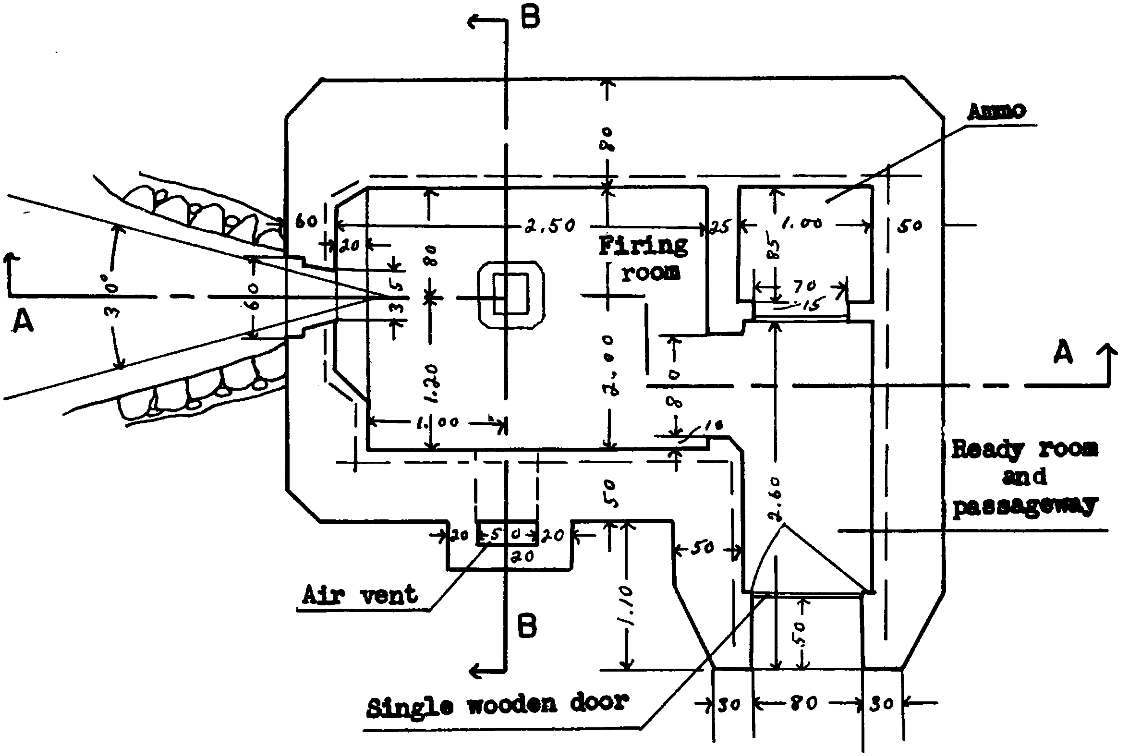
Accessories

Fire port door.....1
Drainage unit......1

II - PILLBOXES

FOR ONE HMG - TYPE A

PLAN CROSS SECTION
(Amount of concrete: about 35 cu m)



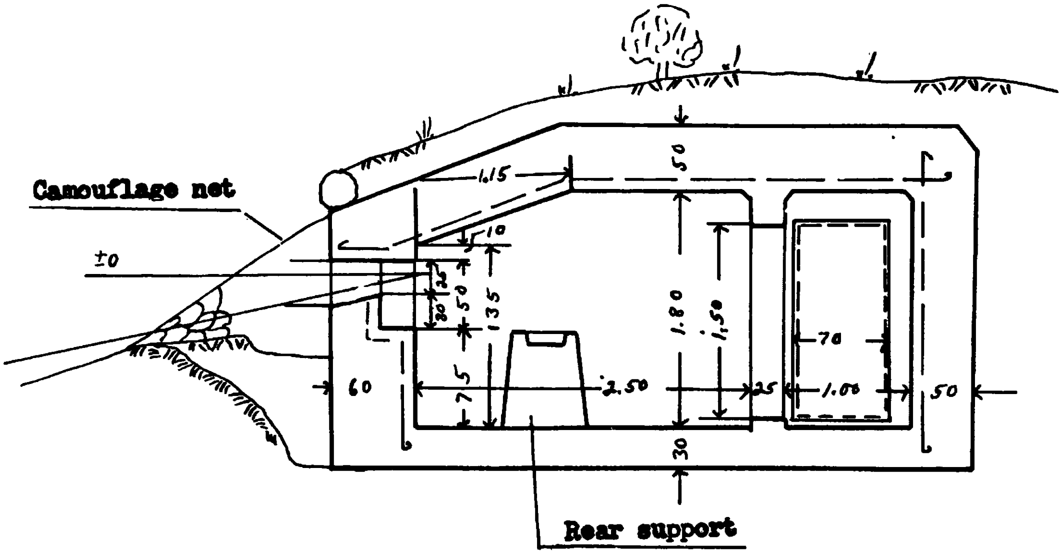
Reinforcing rods: 16mm dia., c-c .20

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II - PILLBOXES

FOR ONE HMG - TYPE A (Continued)

SECTION A-A



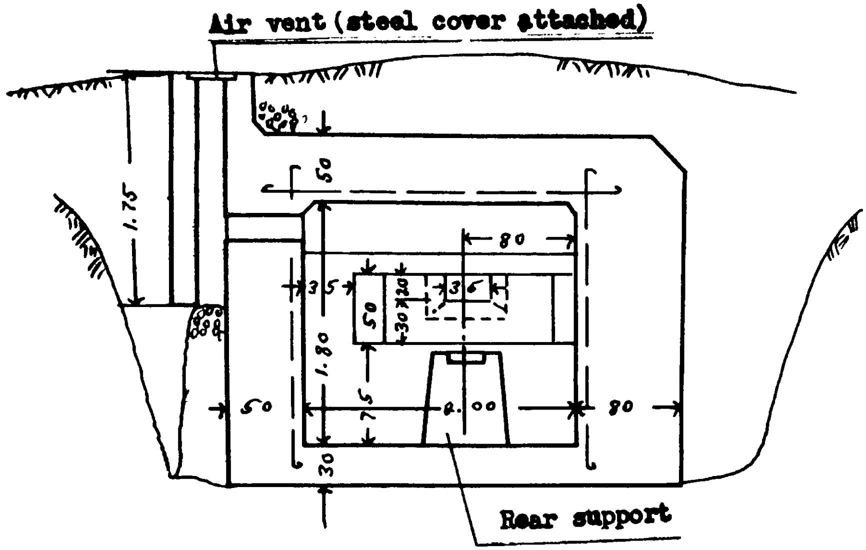
Reinforcing rods: 16mm dia., c-c .20

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II - PILLBOXES

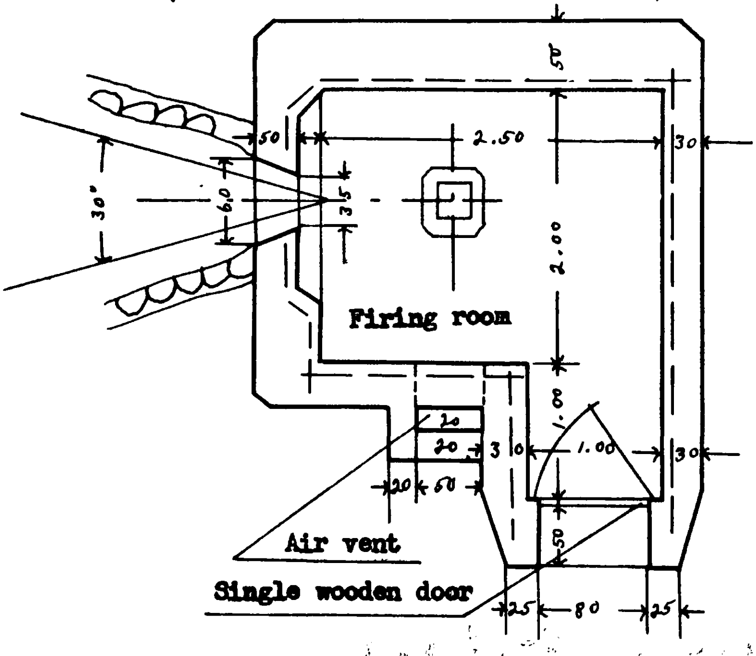
FOR ONE HMG - TYPE A (Continued)

SECTION B-B



FOR ONE HMG - TYPE B

PLAN CROSS SECTION
(Amount of concrete: about 20 cu m)

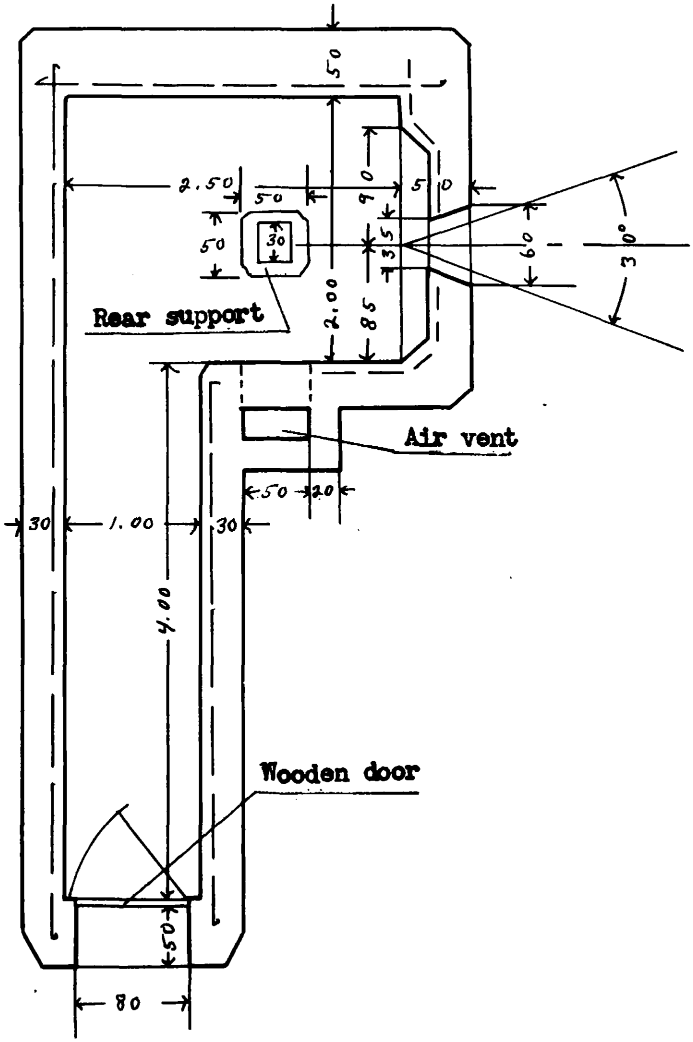


Reinforcing rods: 16mm dia., c-c .20

II - PILLBOXES

FOR ONE HMG - TYPE C

PLAN CROSS SECTION
(Amount of concrete: about 29 cu m)



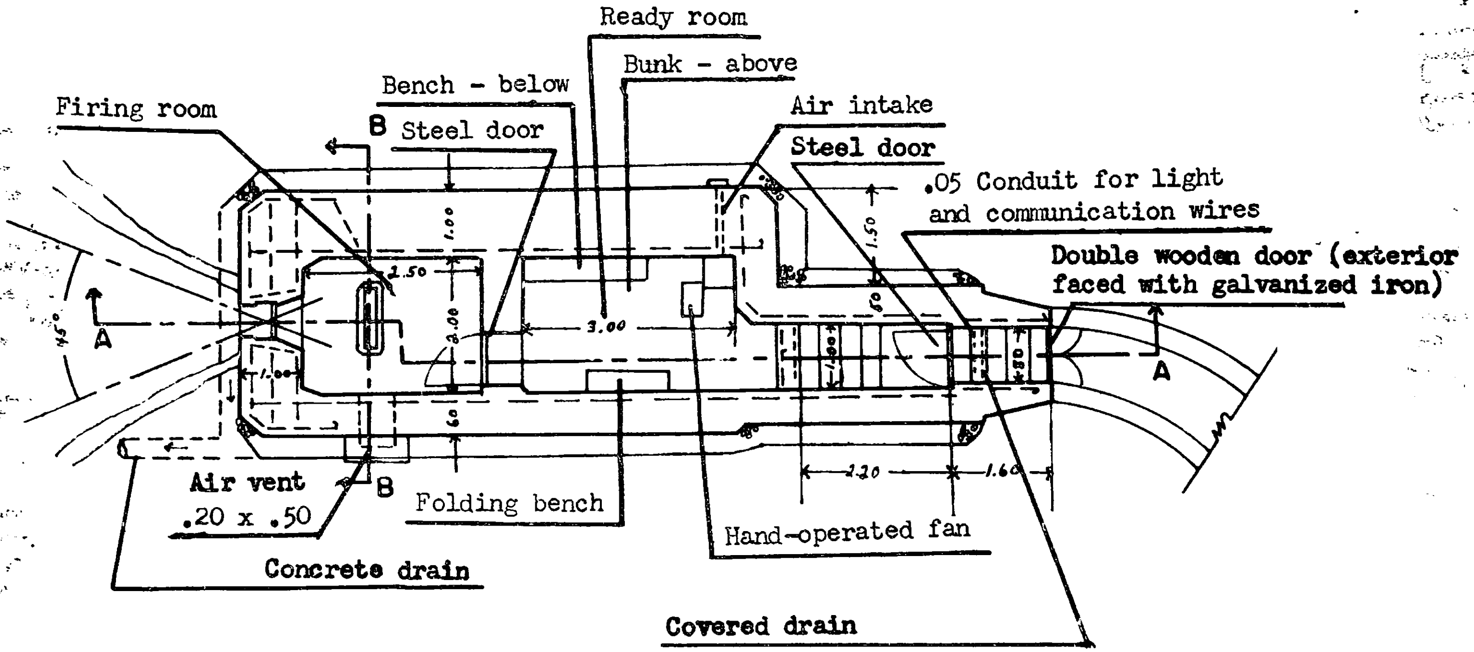
Note: Thickness of concrete protective covering is 30-50cm.

Reinforcing rods: 16mm dia., c-c .20

II - PILLBOXES

FOR ONE HMG (FLANK DEFENSE)

PLAN CROSS SECTION

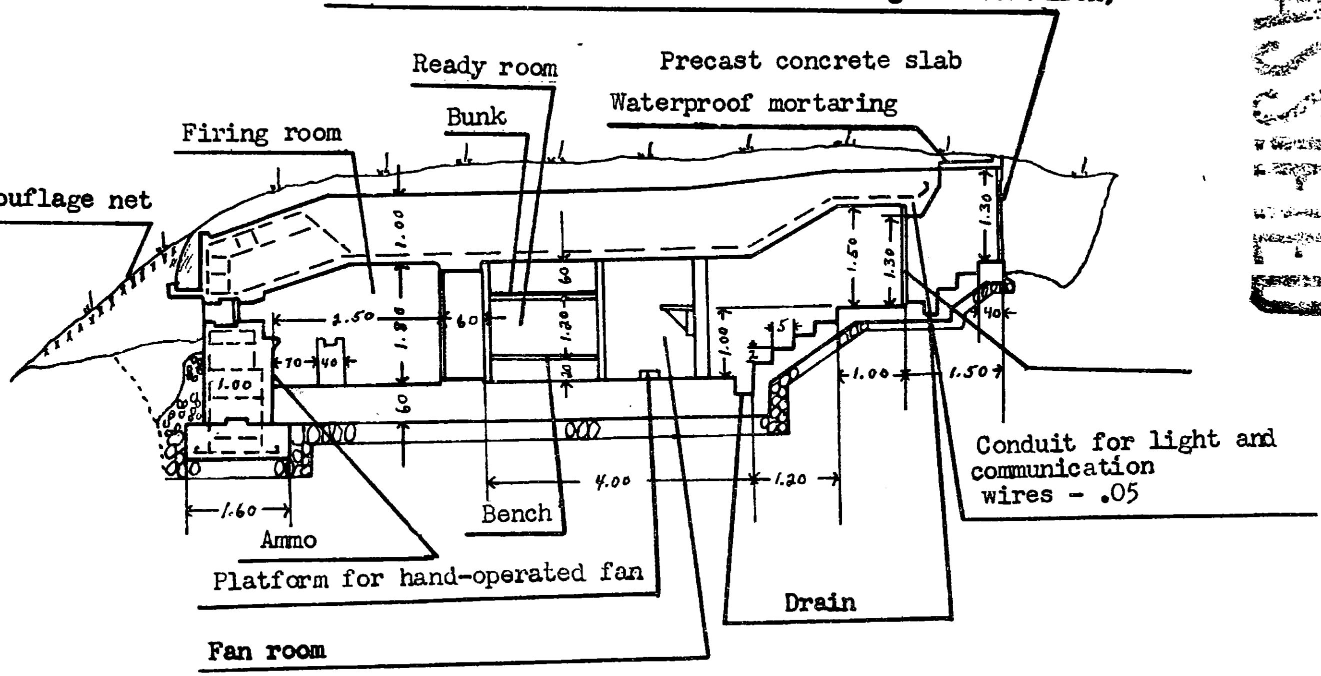


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR ONE HMG (FLANK DEFENSE) (Continued)

SECTION A-A

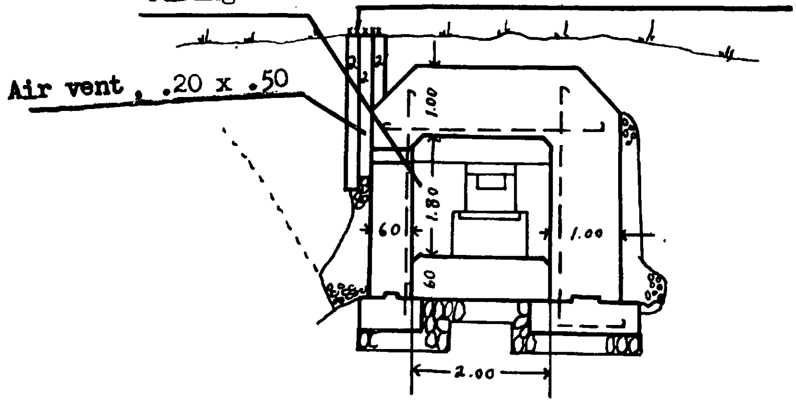


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR ONE HMG (FLANK DEFENSE) (Continued)

SECTION B-B



Reinforcin ods: 16mm dia., c-c .20
16mm dia., c-c .40

Notes:

1. This diagram shows the type of pillbox used for Type 92 HMG.

2. The detail of the fire port is shown in a separate diagram.

3. The fire port wall is camouflaged. If necessary, reduce the amount of area exposed by using slabs of pre-cast concrete; such slabs should not become obstructions to firing.

List of Required Materials

Concrete..................110 cu m
Steel Reinforcement......25 tons
Forms { inner............84 sq m
Forms { outer............120 sq m
Broken Stone.............14 cu m

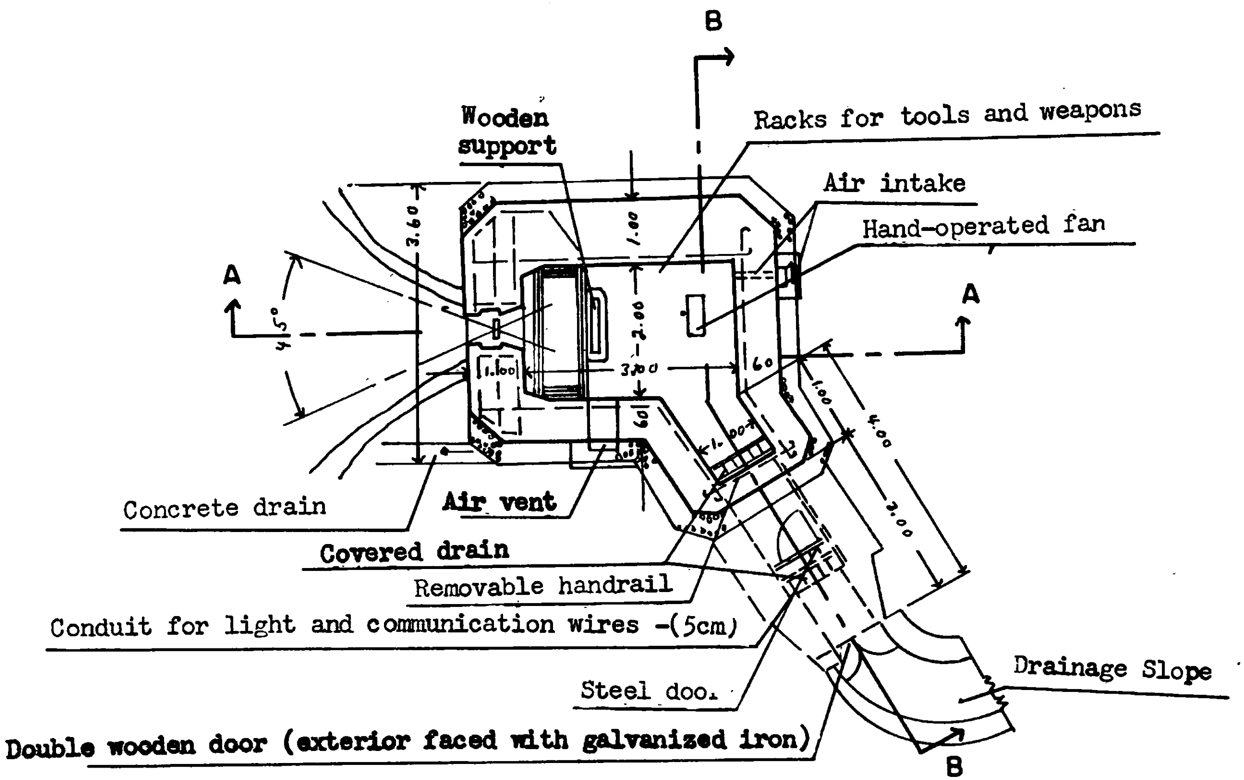
Accessories

Fire port door......... 1
Steel door, entrance... 11
Drain covers........... 2
Intake................. 1
Exhaust................ 1
Bunks.................. 1 man
Benches 2
Drainage unit.......... 1

II - PILLBOXES

FOR ONE HEAVY (OR LIGHT) MG (FLANK DEFENSE)

PLAN CROSS SECTION

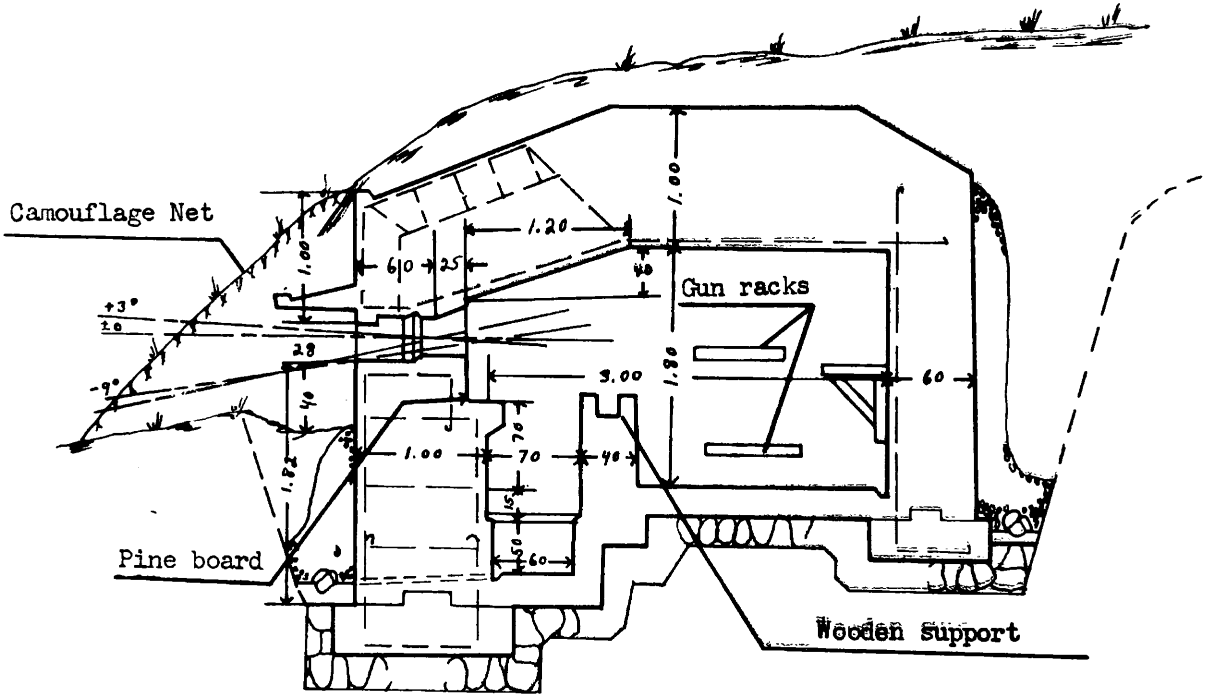


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR ONE HEAVY (OR LIGHT) MG (FLANK DEFENSE) (Continued)

SECTION A-A

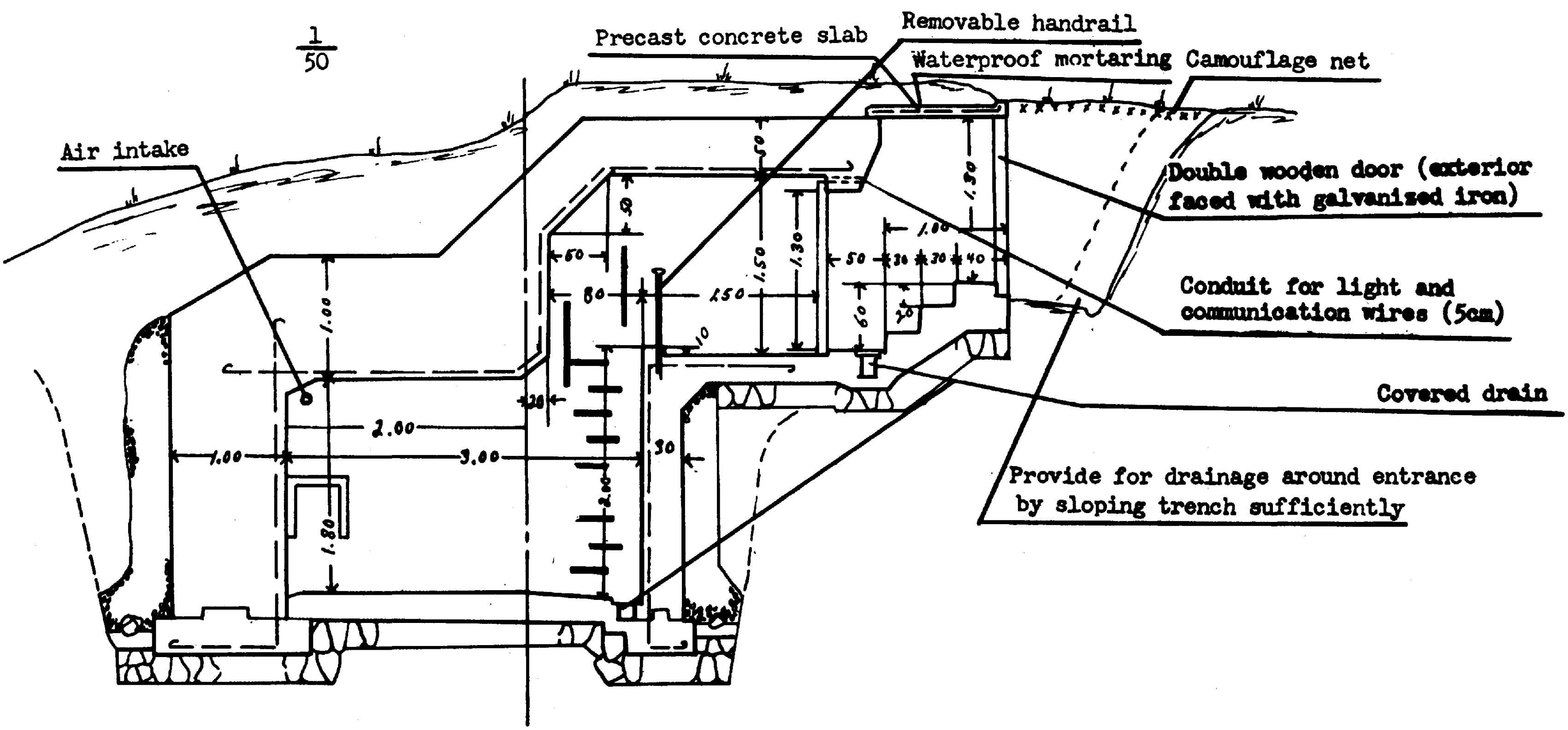


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR ONE HEAVY (OR LIGHT) MG (FLANK DEFENSE) (Continued)

SECTION B-B



List of Required Materials

Concrete..............60 cu m
Steel reinforcement...1.7 ton
Forms { inner.........55 sq m
      { outer.........85 sq m
Broken stone..........12 cu m

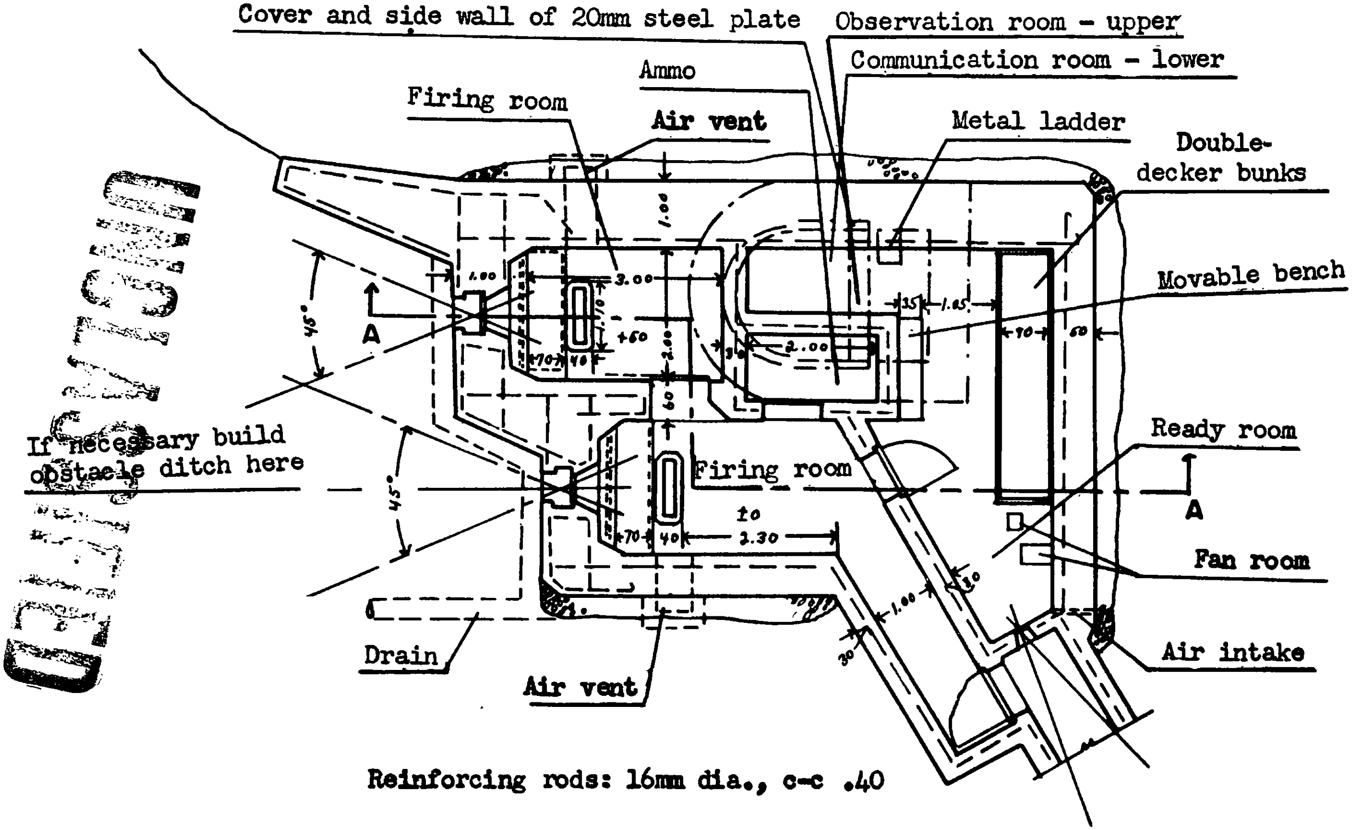
Accessories

Fire port door.......... 1
Entrance door, steel.... 1
Entrance door, wooden... 1
Exhaust................. 1
Intake.................. 1
Drainage unit........... 1

Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR TWO HMG (FLANK DEFENSE)
PLAN CROSS SECTION

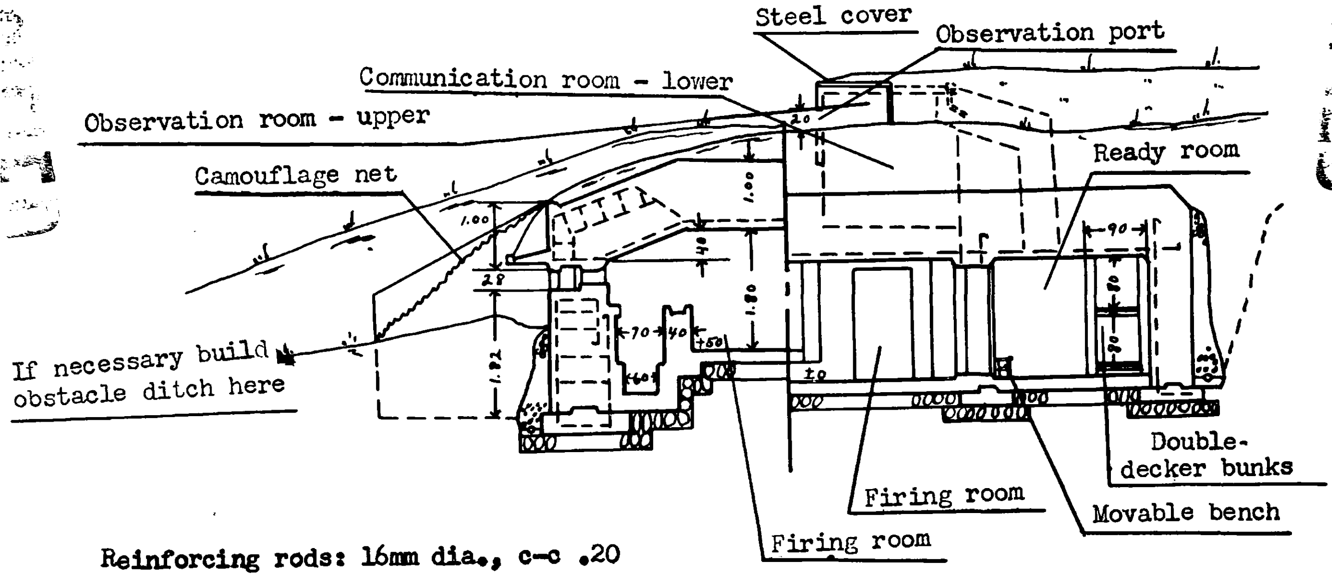


Reinforcing rods: 16mm dia., c-c .40

II - PILLBOXES

FOR TWO HMG (FLANK DEFENSE) (Continued)

SECTION A-A



Reinforcing rods: 16mm dia., c-c .20

II - PILLBOXES

FOR TWO HMG (FLANK DEFENSE) (Continued)

Notes:

1. This diagram shows a pillbox for Type 92 HMG.
2. The detail of the fire port and observation room is on another diagram.
3. Conceal fire port wall with a camouflage net. If circumstances warrant, reduce the amount of exposed surface by using a pre-cast concrete slab. Such a protective cover should be easily removable and should present no hindrance to firing even if demolished.
4. The disposition of foundation, drainage, and entrances should take into account factors of local terrain and soil.

List of Required Materials

Material	Quantity
Concrete	165 cu m
Steel Reinforcement	45 tons
Forms, inner	190 sq m
Forms, outer	165 sq m
Broken Stone	25 cu m

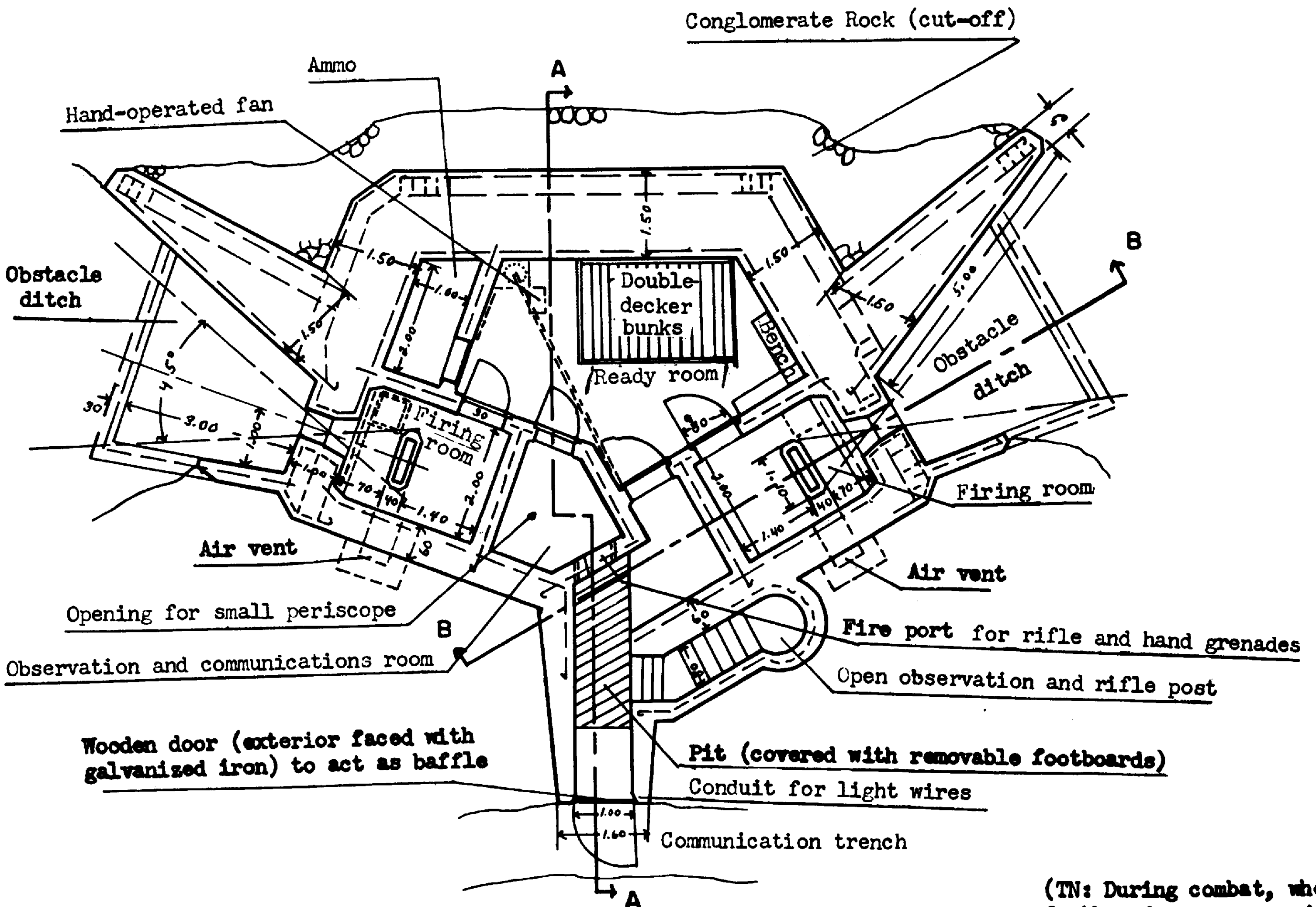
Accessories

Item	Quantity
Entrance doors, steel	4
Entrance doors, wooden	1
Exhausts	2
Intakes	1
Steel cover	1
Fire port door, steel	1
Bunks	4
Chair	1
Bench	1
Metal ladder	1
Drainage unit	1

II PILLBOXES

FOR HMG (FLANK DEFENSE) 2-WAY

PLAN CROSS SECTION



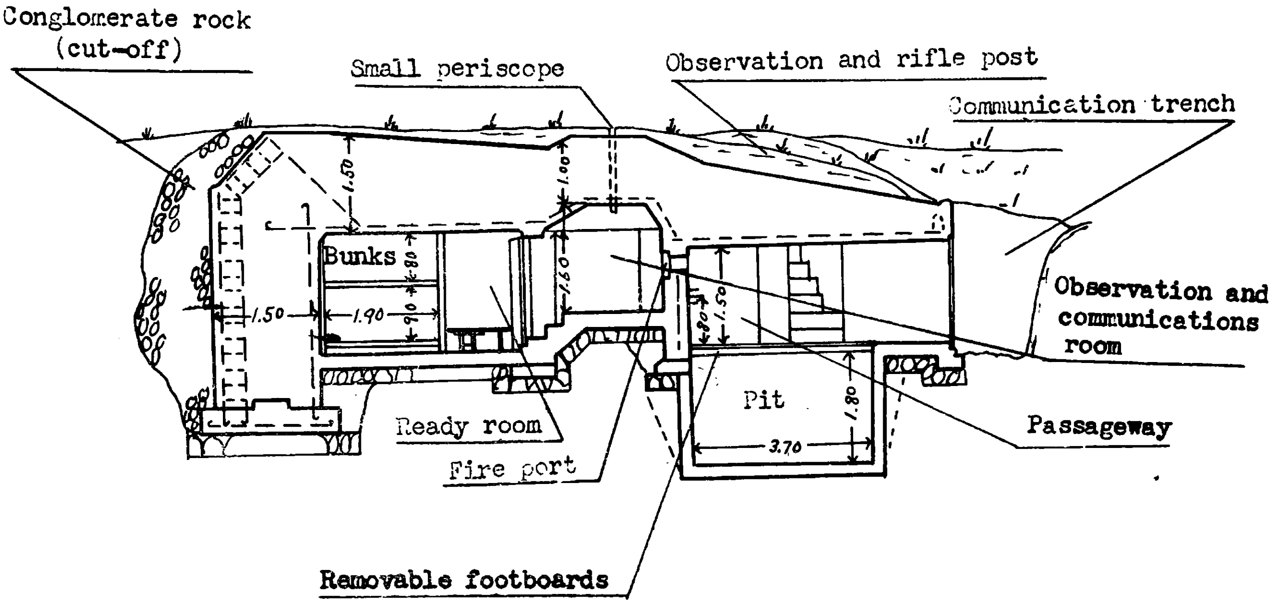
Reinforcing rods: 16mm dia., c-c .20

(TN: During combat, when footboards are removed, pit serves to neutralize effect of grenades and as an obstacle to troops trying to rush the passageway.)

II - PILLBOXES

FOR HMG (FLANK DEFENSE) 2-WAY (Continued)

SECTION A-A

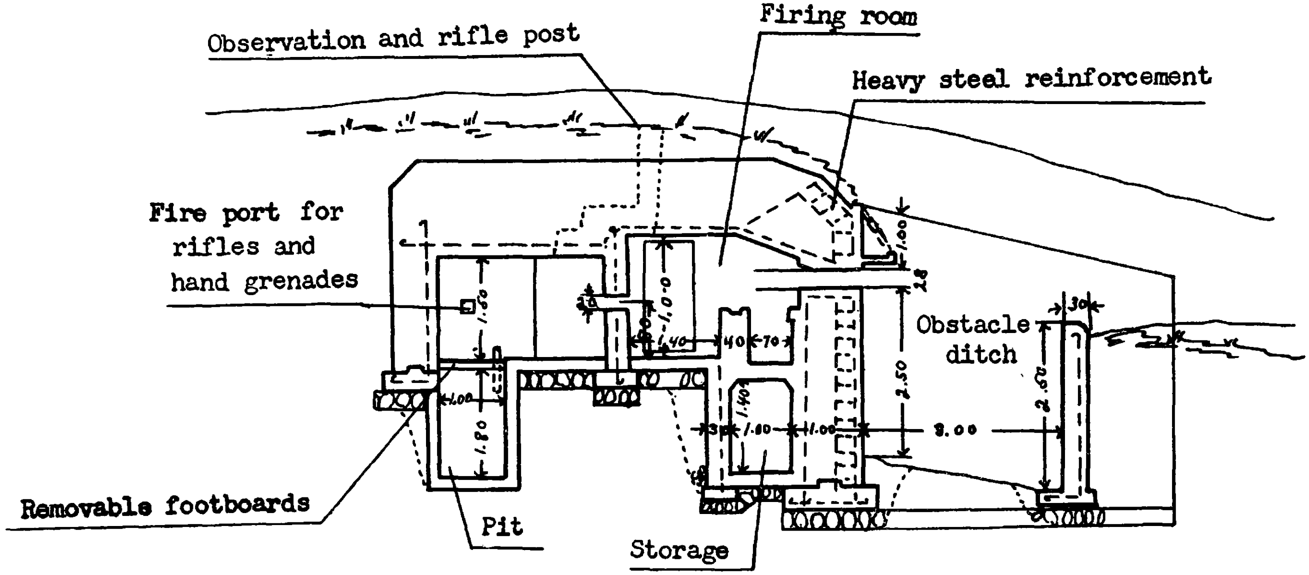


Reinforcing rods: 16mm dia., c-c .20

II - PILLBOXES

FOR HMG (FLANK DEFENSE) 2-WAY (Continued)

SECTION B-B



Reinforcing rods: 16mm dia., c-c .20

II - PILLBOXES

FOR HMG (FLANK DEFENSE) 2-WAY (Continued)

Notes:

1. This diagram shows a type of pillbox for Type 92 HMG.
2. Details of fire port are on a separate diagram.
3. If necessary, the Observation Room and Firing Room are connected by a speaking tube.
4. Disposition of foundation, drainage, and entrances should take into account factors of local terrain and soil.

List of Required Materials

Item	Quantity
Concrete	265 cu m
Steel Reinforcement	12 tons
Forms, inner	240 sq m
Forms, outer	335 sq m
Broken Stone	50 cu m

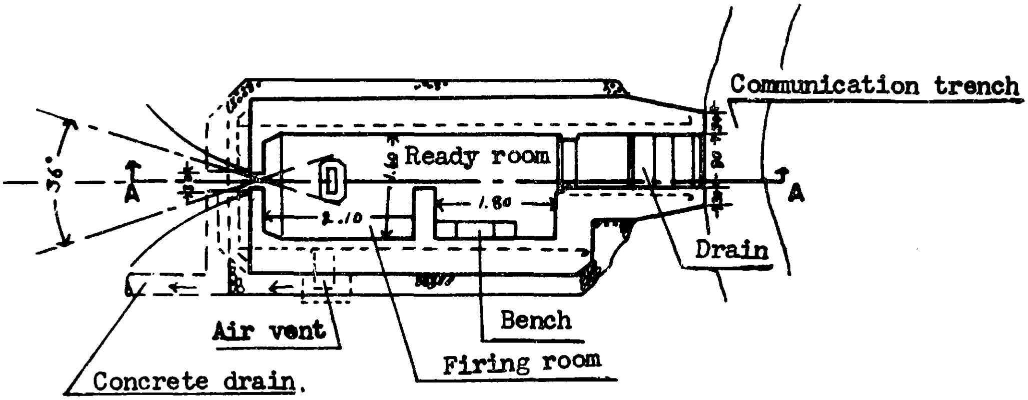
Accessories

Item	Quantity
Entrance doors, steel	3
Entrance doors, wooden	3
Fire port doors, steel	2
Air exhaust vents	2
Pit cover	1
Bunks	6
Bench	1
Manhole cover	2
Metal ladders	2
Covers	2
Periscope port	1
Drainage unit	1
Miscellaneous	

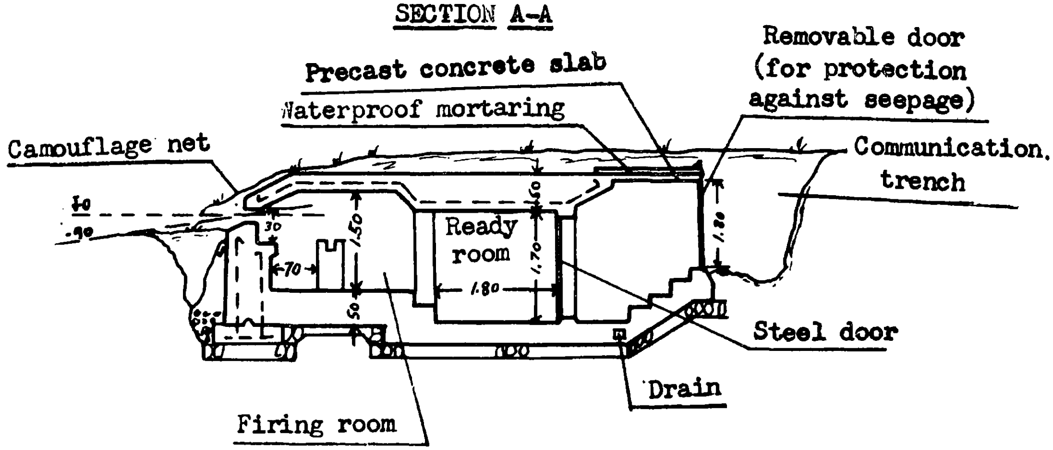
II - PILLBOXES

FOR HMG
(A) LOW COVER, 1 MG (FRONTAL FIRE)

PLAN CROSS SECTION



SECTION A-A

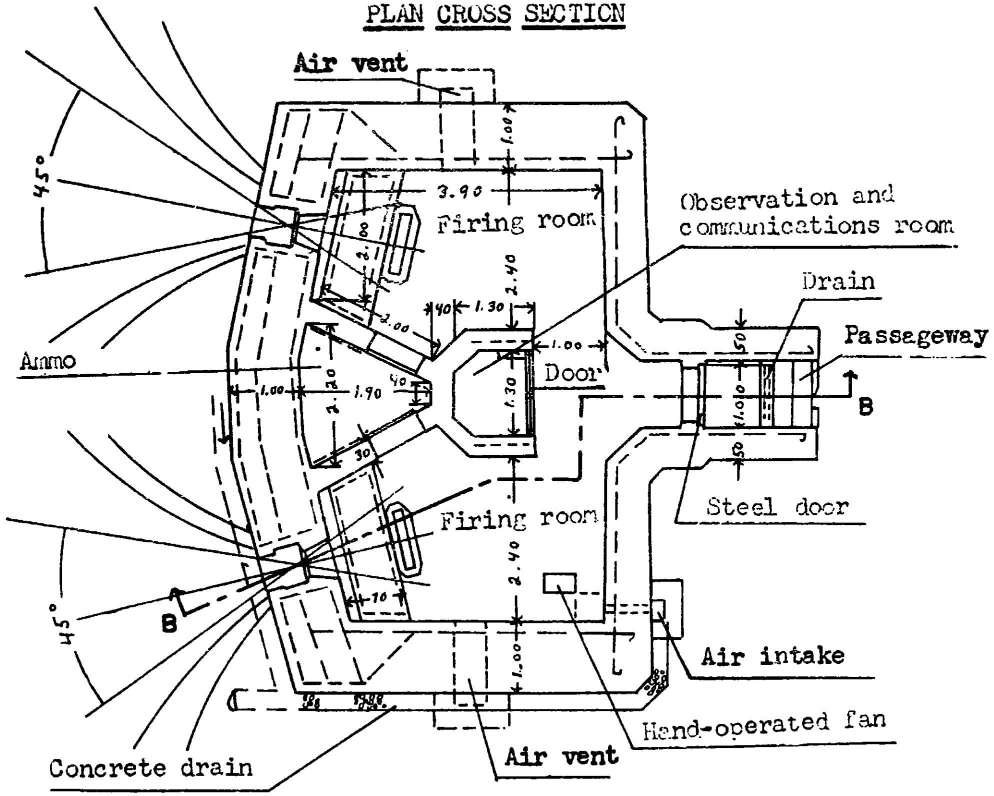


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR HMG (Continued)
(B) 2 MG (FRONTAL FIRE)

PLAN CROSS SECTION

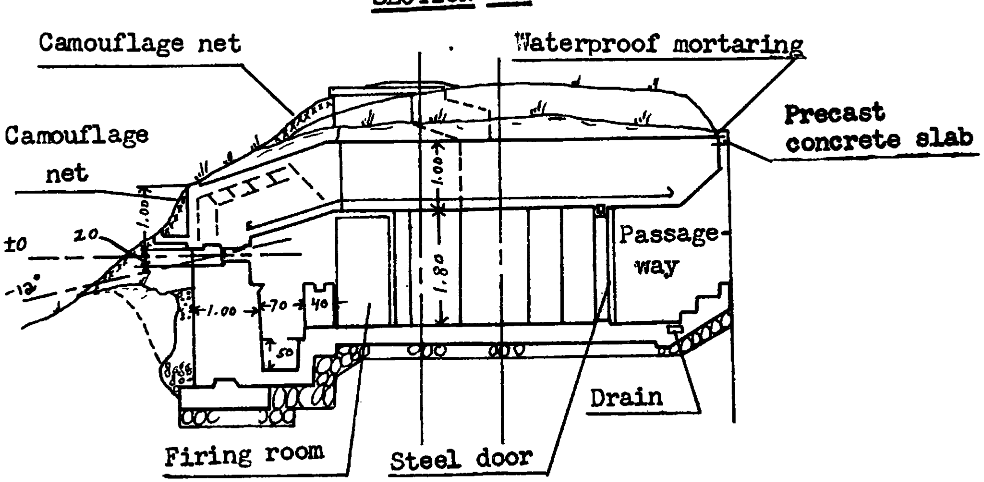


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR HMG (Continued)
(B) 2 MG (FRONTAL FIRE) (Continued)

SECTION B-B



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

II - PILLBOXES

FOR HMG (Continued)

Notes:

1. This diagram shows a type of casemate employing Type 92 MG.

2. Fire port detail is on another diagram.

3. Camouflage fire port wall with a net. If conditions warrant, the amount of exposed surface may be reduced by using a pre-cast concrete slab; this should be easily removable and should present no hindrance to firing even if demolished.

4. The cover for the Firing Room of the low cover pillbox is to be made of concrete, ratio 1:1:2, reinforcement 5%.

5. The disposition of foundation, drainage, and entrance should take into account factors of local terrain and soil.

I. Low Cover, One MG, Frontal Fire

Concrete..........30 cu m
Steel Reinforcement.....1 ton
Forms { inner......42 sq m
Forms { outer......50 sq m
Broken Stone...... 8 cu m

Steel door, entrance.....1
Exhaust..................1
Drainage unit............1

II. Two MG, Frontal Fire

Concrete.......135 cu m
Steel Reinforcement......5 tons
Forms { inner......125 sq m
Forms { outer......140 sq m
Broken Stone......20 cu m

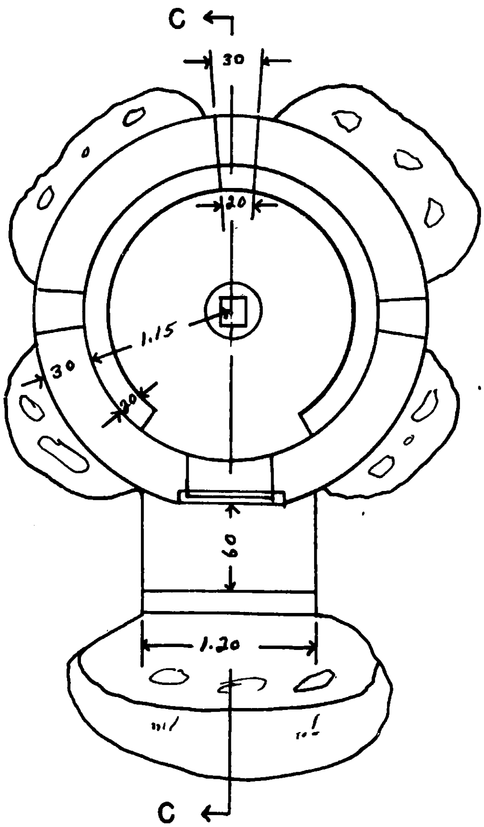
Entrance door, steel.....1
Entrance door, wooden....4
Entrance door, steel....2
Steel cover.............[illegible]
Exhaust.................[illegible]
Intake..................[illegible]
Metal ladder............1
Drainage unit...........1
Miscellaneous...........

II - PILLBOXES

FOR ENFILADE FIRE ON ROAD IN DENSELY WOODED AREA

Concrete: 9 cu m
Form: 40 sq m

PLAN CROSS SECTION

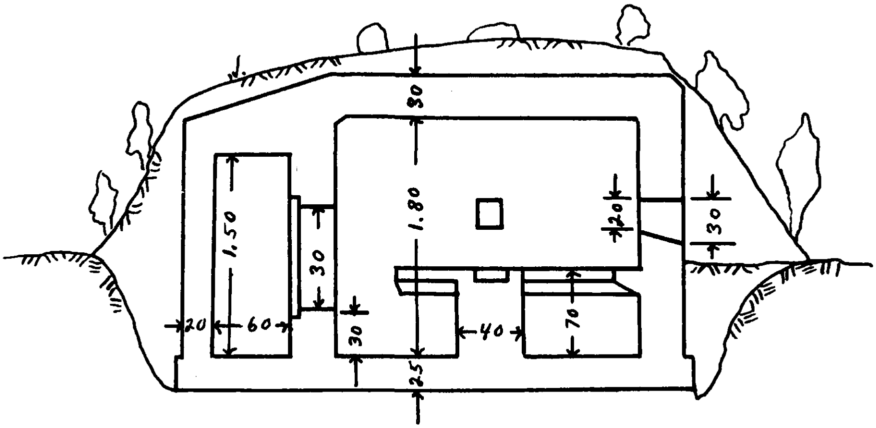


Reinforcing rods: 16mm dia., c-c .20

II - PILLBOXES

FOR ENFILADE FIRE ON ROAD IN DENSELY WOODED AREA (Continued)

SECTION C-C



Reinforcing rods: 16mm dia., c-c .20

Notes:

1. The facing of the fire port should correspond to the direction of the road and the line of fire.

2. Light and heavy machine guns and rifles can all be used.

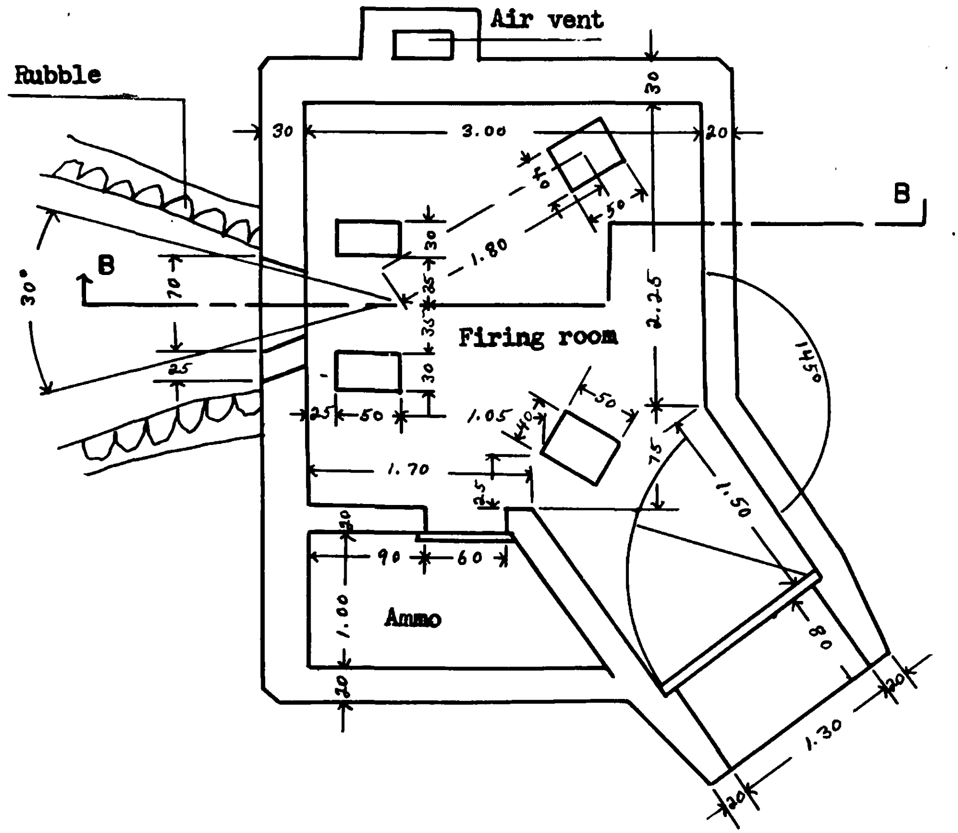
3. The road is of the rotary type; the width of the road at the rotary section (TN: SHUI NO RO) should be greater than 4m.

III - CASEMATES

FOR ONE RAPID-FIRE GUN /TYPE I/

Concrete: 15 cu m
Form: 93 sq m

PLAN CROSS SECTION



1. The thickness of the wall toward the enemy is 50cm, that of the opposite wall 30cm.

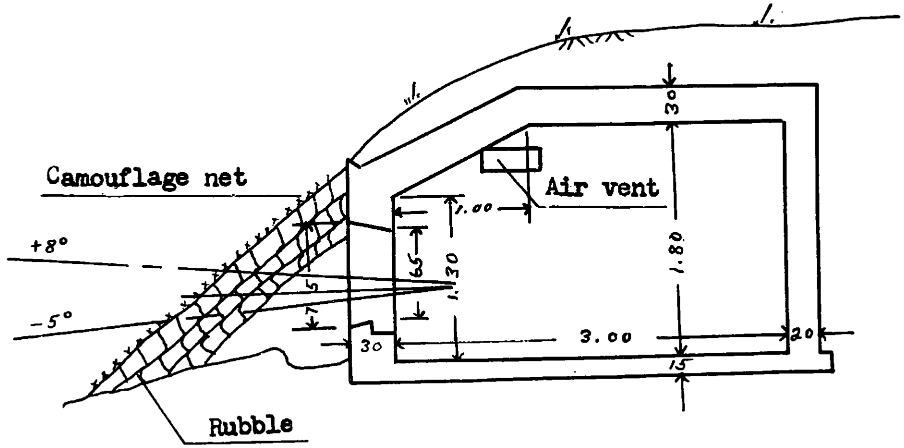
2. Provision is made for the reduction of noise in the firing room.

Reinforcing rod: [illegible] d[illegible] c .20

III - CASEMATES

FOR ONE RAPID-FIRE GUN /TYPE I/ (Continued)

SECTION B-B

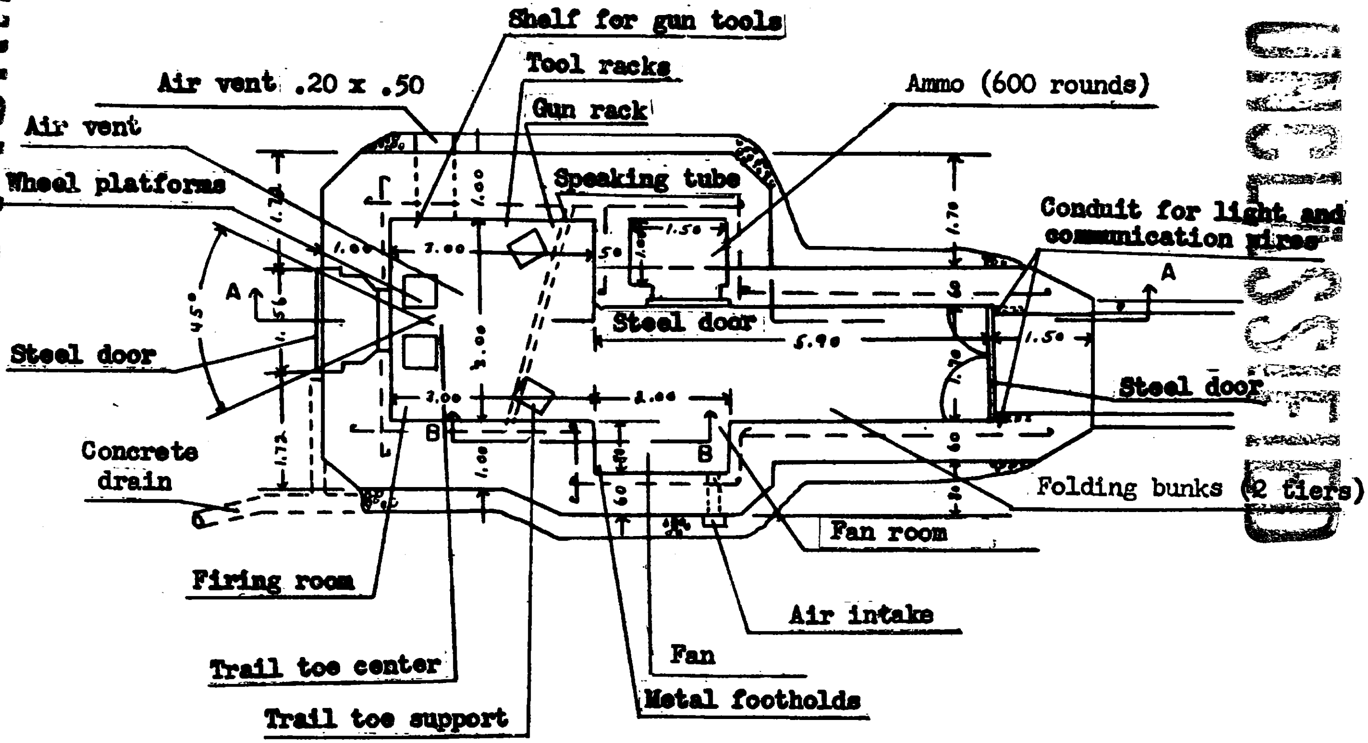


Reinforcing rods: 16mm dia., c-c .20.

III - CASEMATES

FOR ONE RAPID-FIRE GUN /TYPE II/

PLAN CROSS SECTION

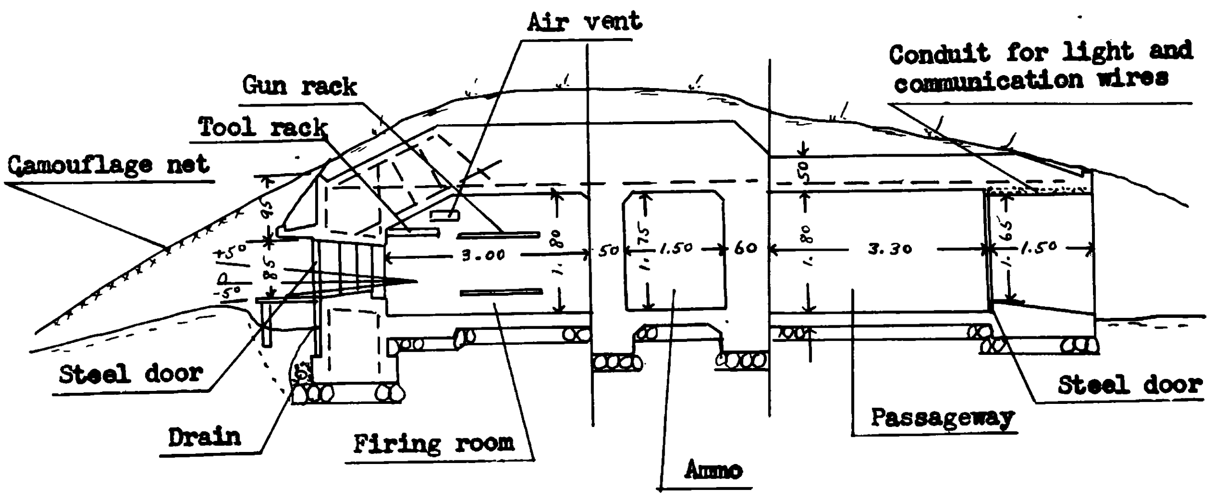


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

III - CASEMATES

FOR ONE RAPID-FIRE GUN /TYPE II/ (Continued)

SECTION A-A

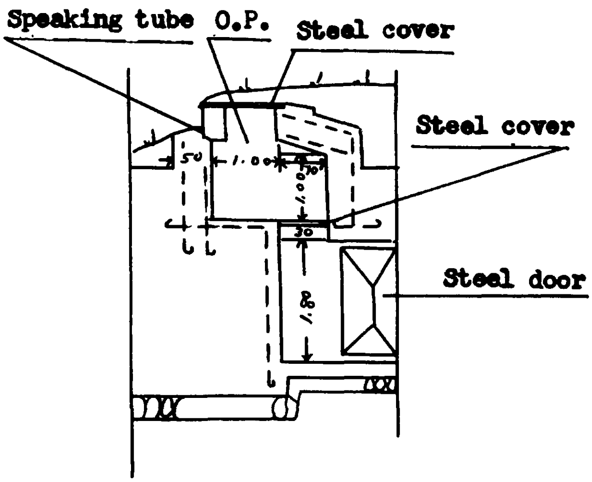


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

III - CASEMATES

FOR ONE RAPID-FIRE GUN /TYPE II/ (Continued)

SECTION B-B



Notes

1. This diagram shows a casemate employing a Type 94 37mm gun, with a horizontal traverse of 45°, and angle of elevation of 5°, and an angle of depression of 5°.
2. Place one wooden box for empty cartridge cases in the firing room (50 round capacity).
3. Disposition of foundation, drainage, and entrances should take into account factors of local terrain and soil.

List of Required Materials

Item	Quantity
Concrete	117 cu m
Steel reinforcement	42 ton
Forms: inner	105 sq m
Forms: outer	135 sq m
Broken stone	20 cu m

Accessories

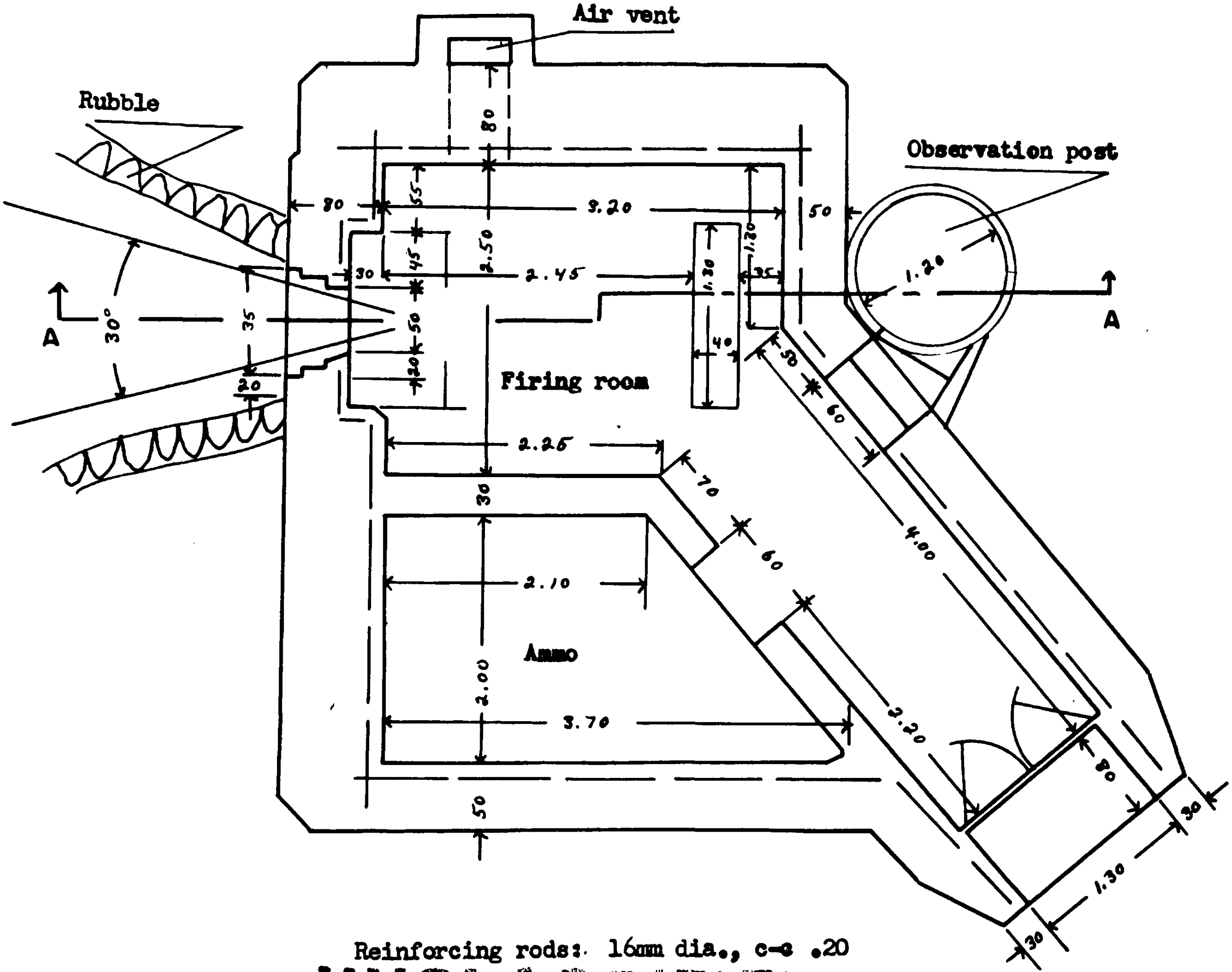
Item	Quantity
Steel door, fireport	1
Steel doors, entrance	2
Steel cover	1
Wheel platforms	2
Trail spade ditches	2
Metal ladder	1
Gun tool rack	1
Tool rack	1
Rifle rack	1
Intake	1
Exhaust	1
Speaking tube	1
Drainage unit	1
Folding bunk	1
Miscellaneous	

III - CASEMATES

FOR ONE REGIMENTAL GUN /TYPE I/

Concrete: 50 cu m
Form: 148 sq m

PLAN CROSS SECTION $\frac{1}{50}$

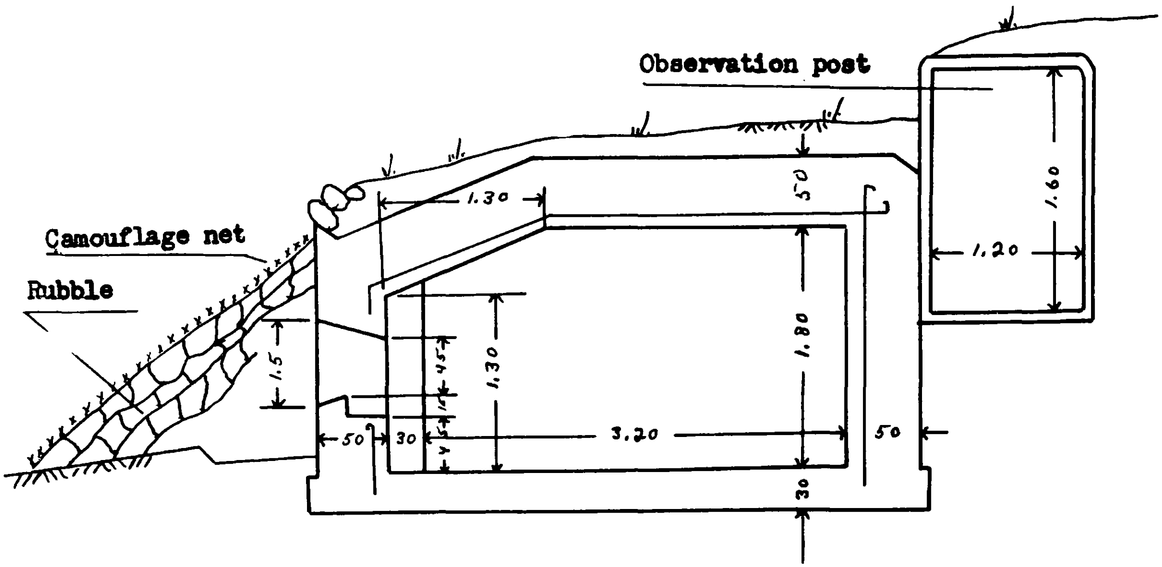


Reinforcing rods: 16mm dia., c-c .20

III - CASEMATES

FOR ONE REGIMENTAL GUN /TYPE I/ (Continued)

SECTION A-A

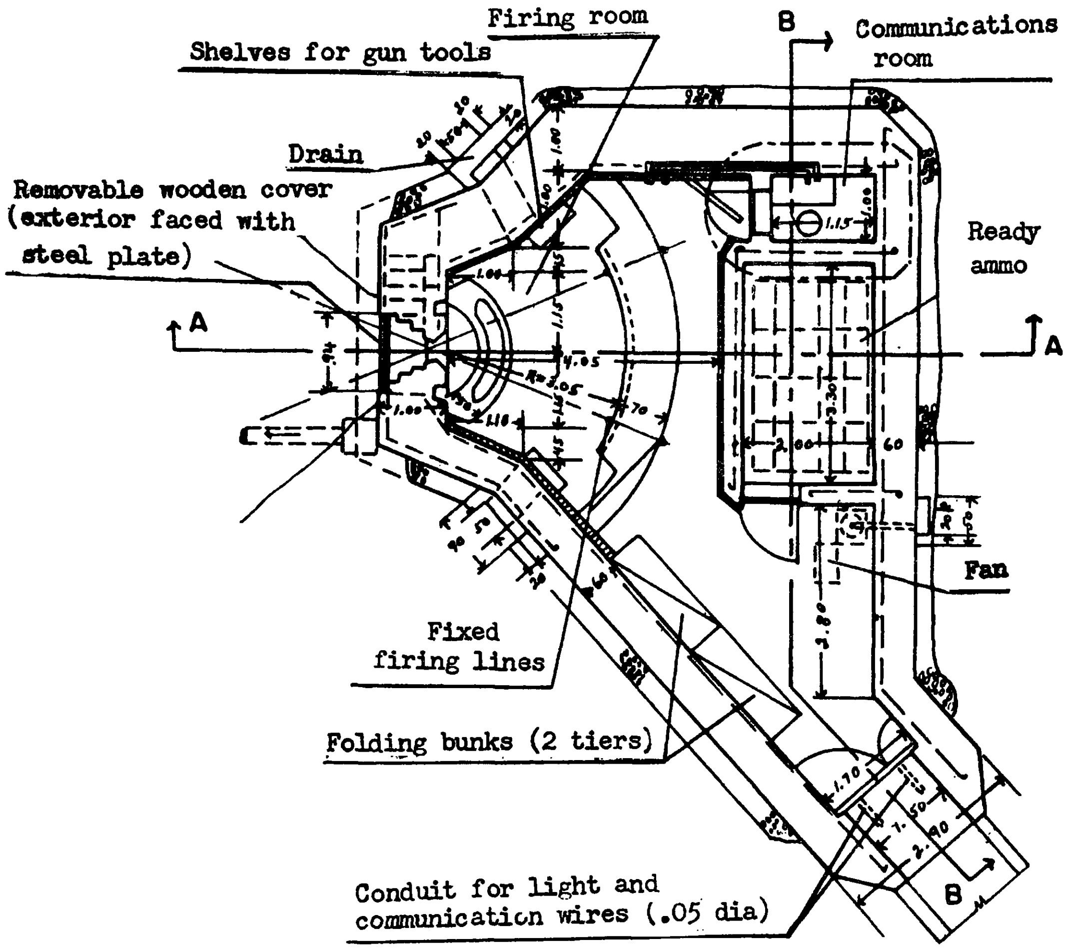


Reinforcing rods: 16mm dia., c-c .20

III - CASEMATES

FOR ONE REGIMENTAL GUN /TYPE II/

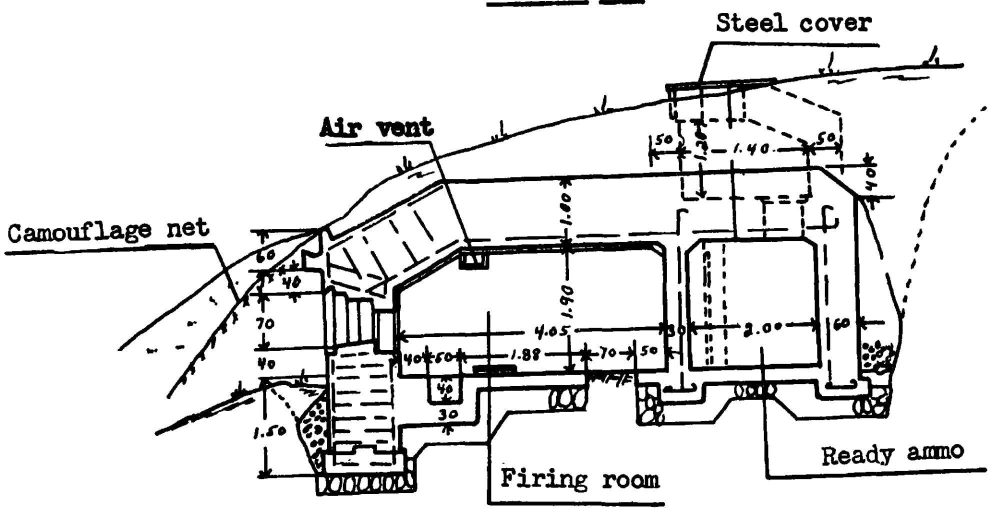
PLAN CROSS SECTION



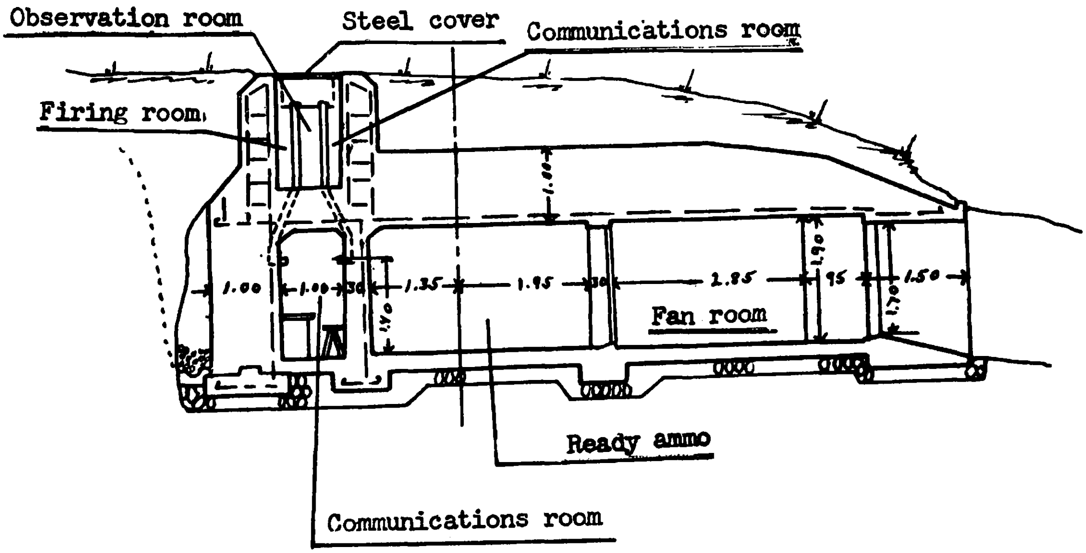
III - CASEMATES

FOR ONE REGIMENTAL GUN /TYPE II/ (Continued)

SECTION A-A



SECTION B-B



III - CASEMATES

FOR ONE REGIMENTAL GUN /TYPE II/ (Continued)

Notes:

1. This casemate may be used for both Type 94 and Type 41 Mt Gun; however, angles of elevation and depression must be calculated to meet the specifications of the particular gun employed.
2. The detail of the fire port is shown in a separate diagram.
3. The Firing Room is furnished with an empty cartridge case box, covered; capacity 50 rounds.
4. The disposition of foundation, drainage, entrances should take into account factors of local terrain and soil.

List of Required Materials

Item	Quantity
Concrete	145 cu m
Steel Reinforcement	5.4 tons
Forms: inner	155 sq m
Forms: outer	180 sq m
Broken Stone	25 cu m

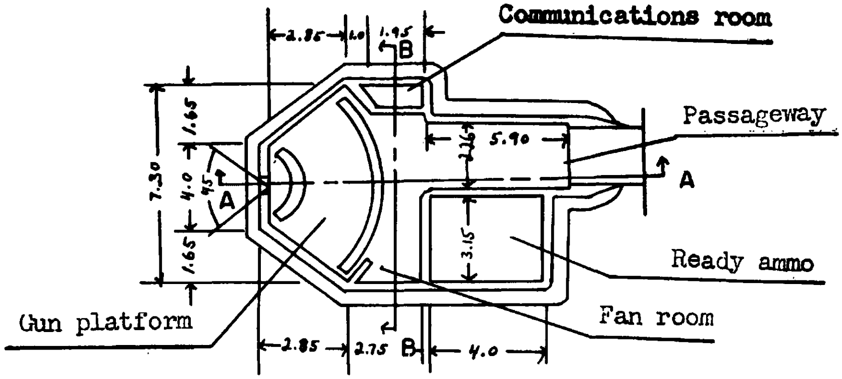
Accessories

Item	Quantity
Steel cover	1
Fire port door, steel	1
Fire port door, wooden	1
Trail spade ditch	1
Entrance doors, steel	3
Metal ladder	1
Shelves for firing tools	2
Communications Room desk	1
Trail circle platform	1
Folding bunks	4 men
Intake	1
Exhaust	1
Speaking tube	1
Rifle and tool rack	1
Drainage unit	1
Miscellaneous	

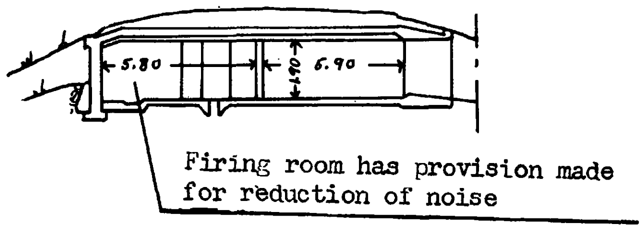
III - CASEMATES

FOR FIELD GUN

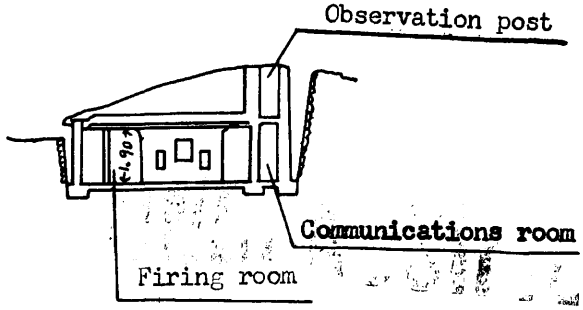
PLAN CROSS SECTION



SECTION A-A



SECTION B-B

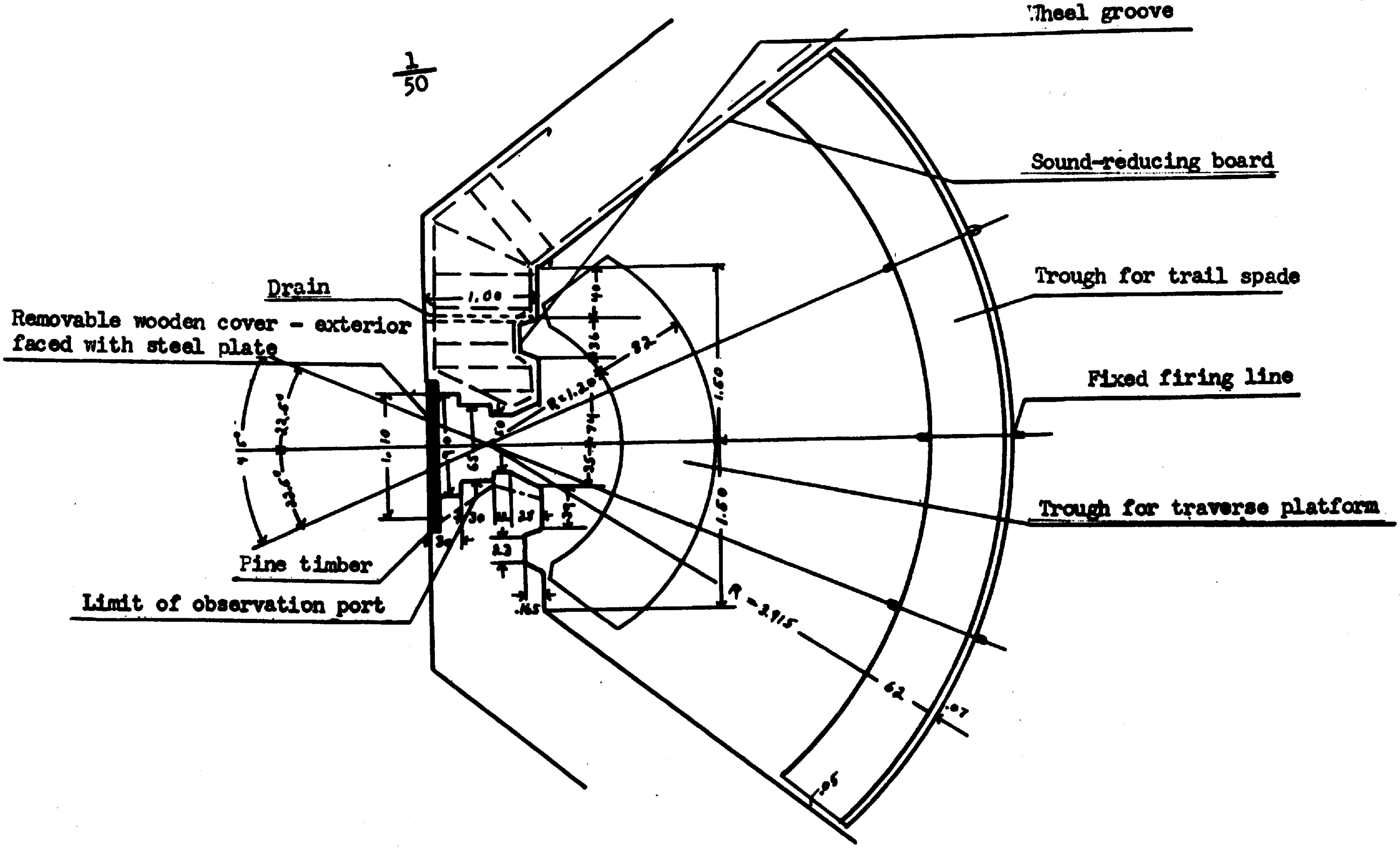


III - CASEMATES

EMBRASURE AND TRAVERSE PLATFORM OF FIELD GUN CASEMATE

(A) EMBRASURE AND BASE FOR TRAVERSE PLATFORM

PLAN CROSS SECTION

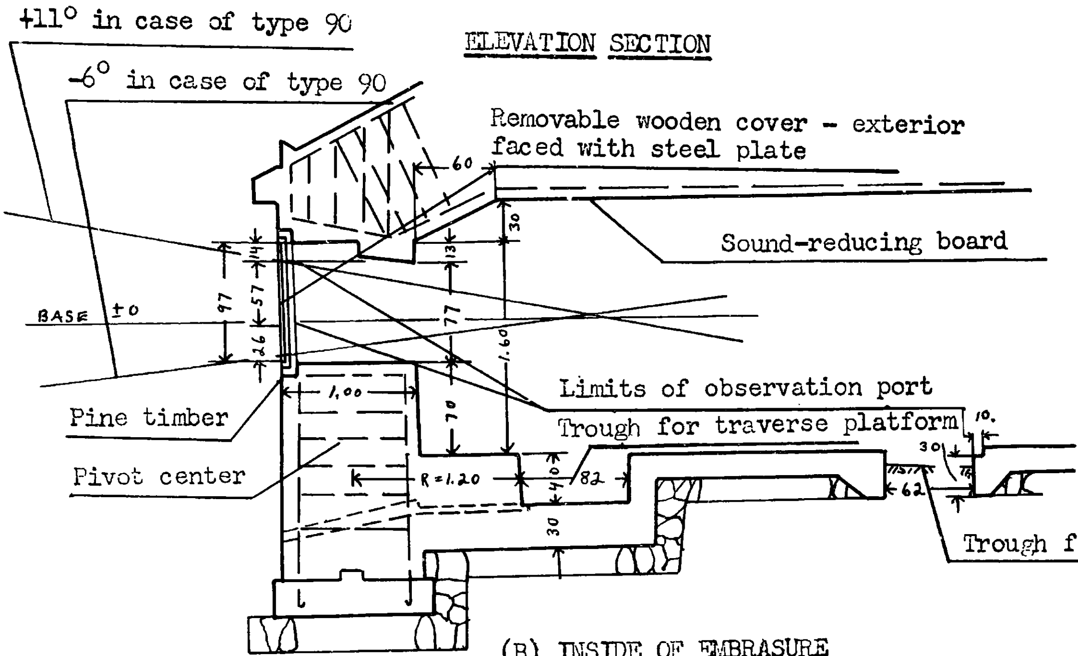


III - CASEMATES

EMBRASURE AND TRAVERSE PLATFORM OF FIELD GUN CASEMATE

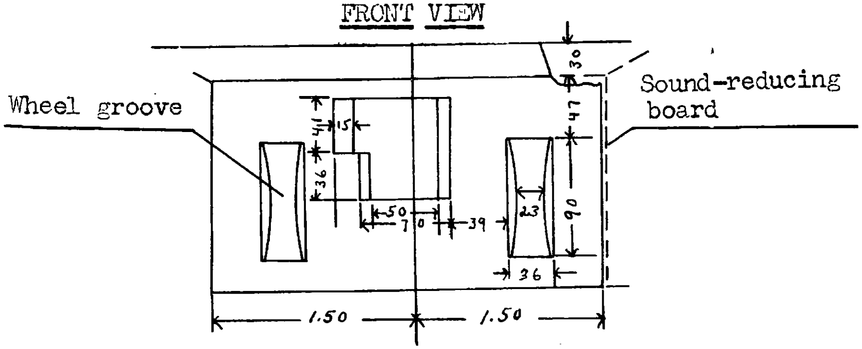
(A) EMBRASURE AND BASE FOR TRAVERSE PLATFORM (Continued)

ELEVATION SECTION



(B) INSIDE OF EMBRASURE

FRONT VIEW

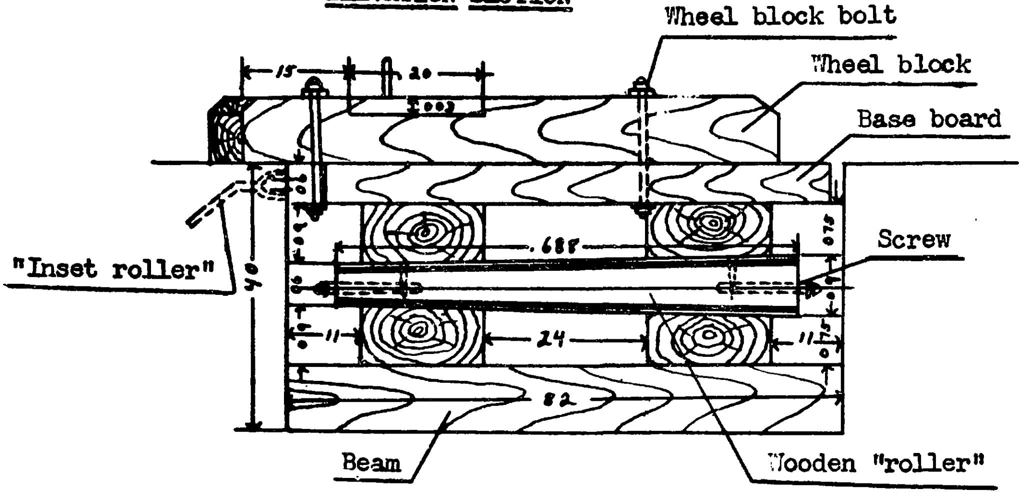


III - CASEMATES

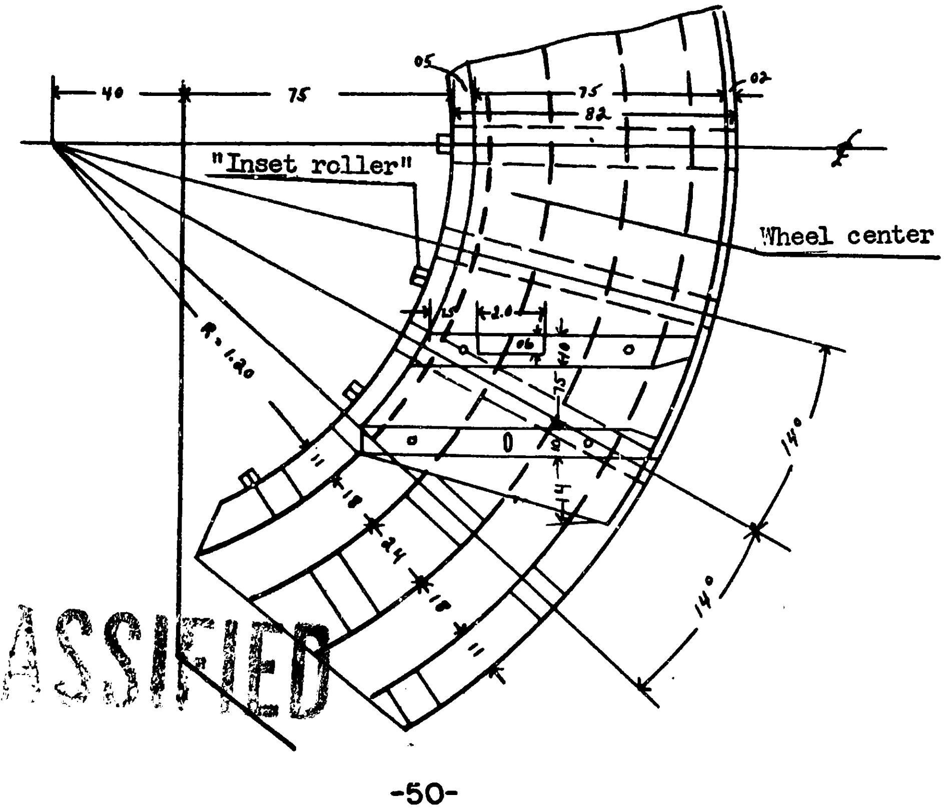
EMBRASURE AND TRAVERSE PLATFORM OF FIELD GUN CASEMATE

(C) DETAIL OF TRAVERSE PLATFORM

ELEVATION SECTION

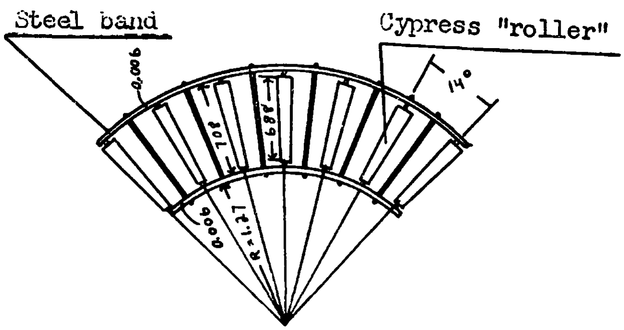


PLAN CROSS SECTION



EMBRASURE AND TRAVERSE PLATFORM OF FIELD GUN CASEMATE

(D) GUIDE RAIL

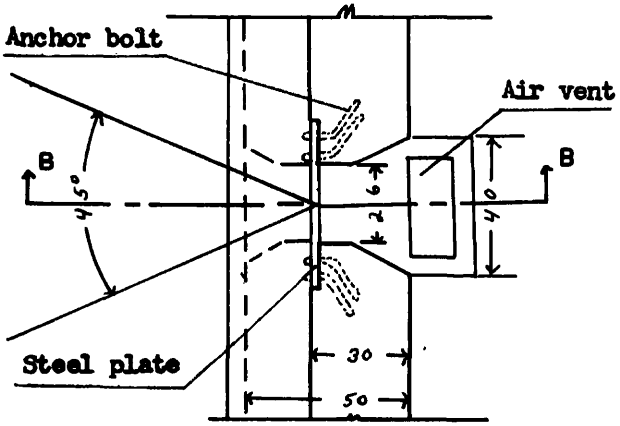


1. This diagram shows the standard construction for employing Type 95, Type 90 and Modified Type 38 Field Gun without removal of wheels and establishes the angle of elevation appropriate to each gun.
2. In the type of casemate in this diagram the Type 95 Field Gun can fire at an angle of elevation of 17° and an angle of depression of 0°; the Type 90 Field Gun can fire at an angle of elevation of 11° and an angle of depression of 8°; the modified Type 38 Field Gun can fire at an angle of elevation of 15° and an angle of depression of 0°; within the observation port(?) the angle of elevation of the Type 90 Field Gun is 3° and the angle of depression of the Modified Type 38 Field Gun is 6°.
3. Sound-reducing wall board is to be installed on the inside surface of the front wall.
4. The detail of the "inset roller" which is used to fix the wheels firmly is similar to the one used in the mountain gun casemate.
5. Use hard wood as much as possible.

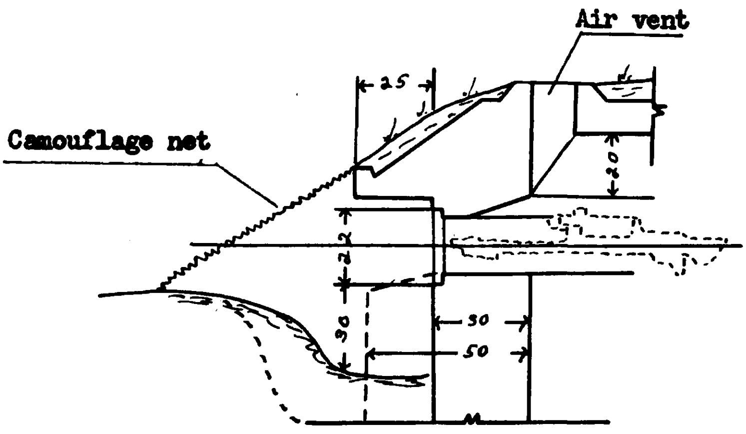
IV - FIRE PORTS

DETAIL OF FIRE PORT - TYPE I

PLAN CROSS SECTION



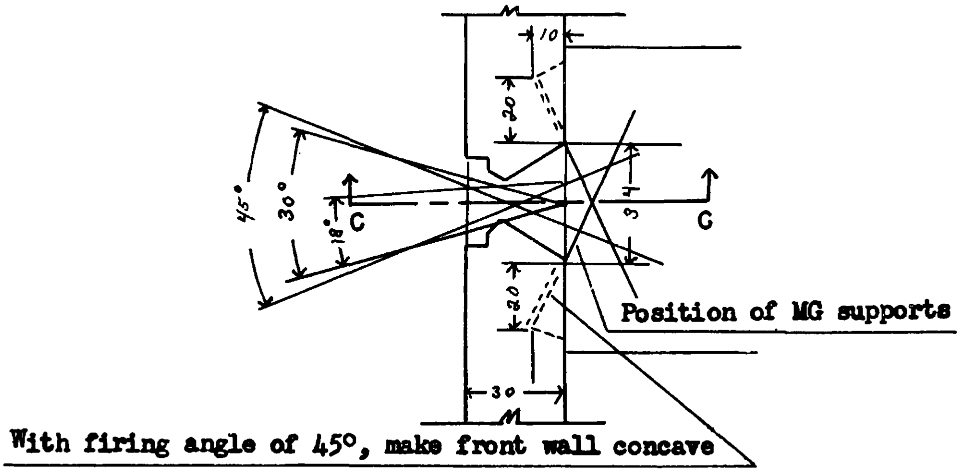
SECTION B-B



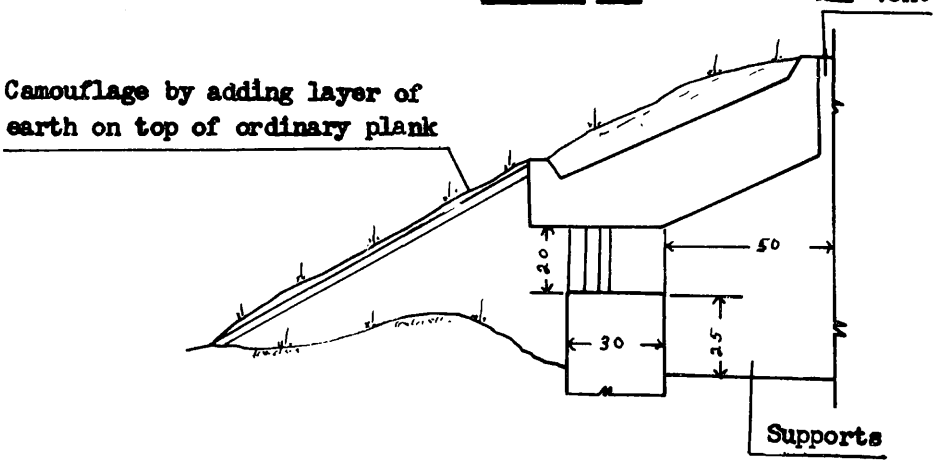
IV - FIRE PORTS

DETAIL OF FIRE PORT - TYPE II

PLAN CROSS SECTION



SECTION C-C

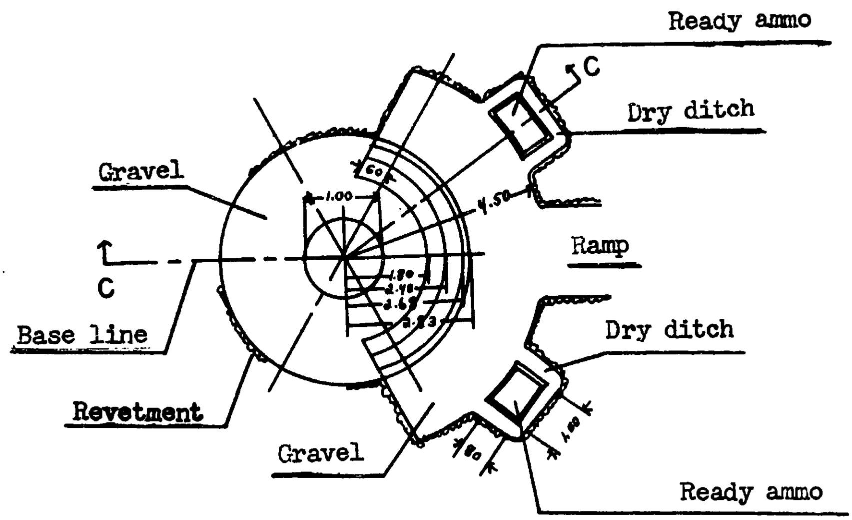


Type I shows the type of port used for firing by inserting the gun muzzle into the fire port without using MG supports; Type II shows the type used when MG supports are used.

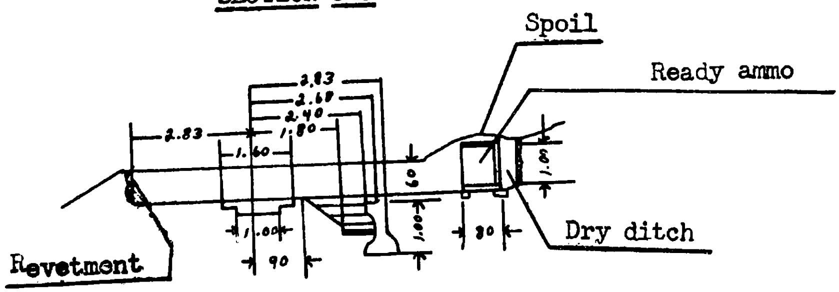
V. GUN PLATFORMS

FOR TYPE 38 FIELD GUN

PLAN CROSS SECTION



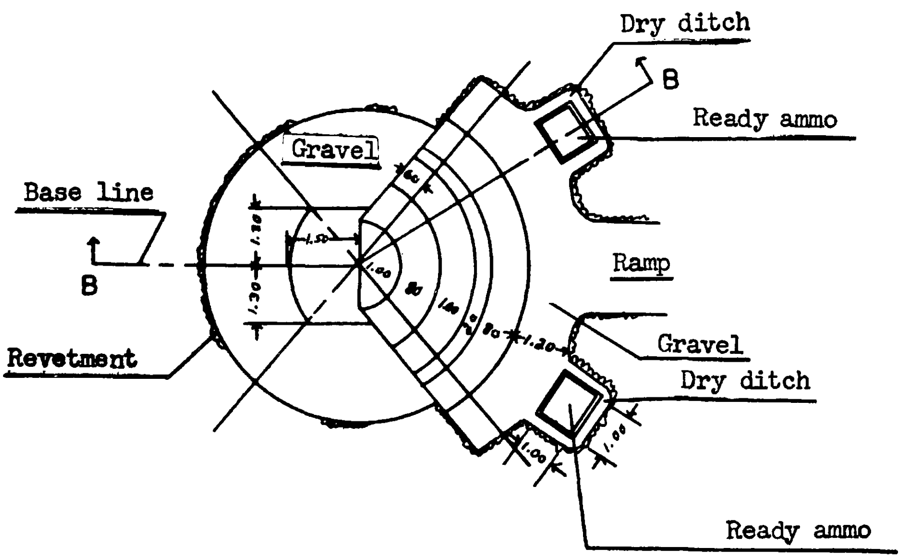
SECTION C-C



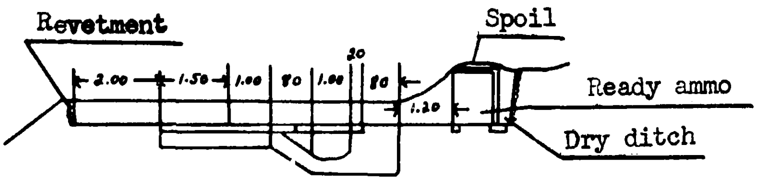
V - GUN PLATFORMS

FOR TYPE 38 10cm CANNON

PLAN CROSS SECTION



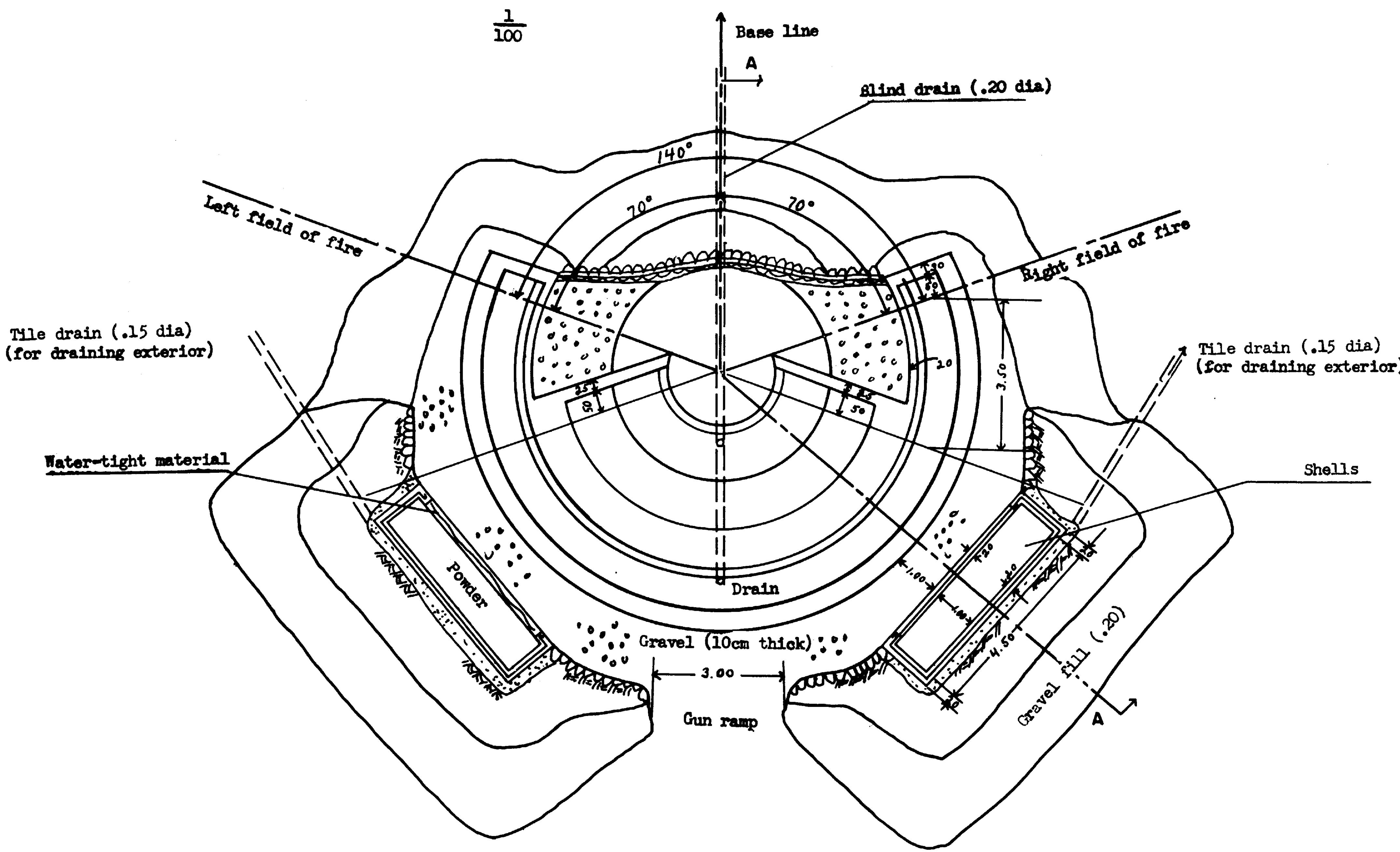
SECTION B-B



V - GUN PLATFORMS

FOR TYPE 89 15cm CANNON

PLAN CROSS SECTION

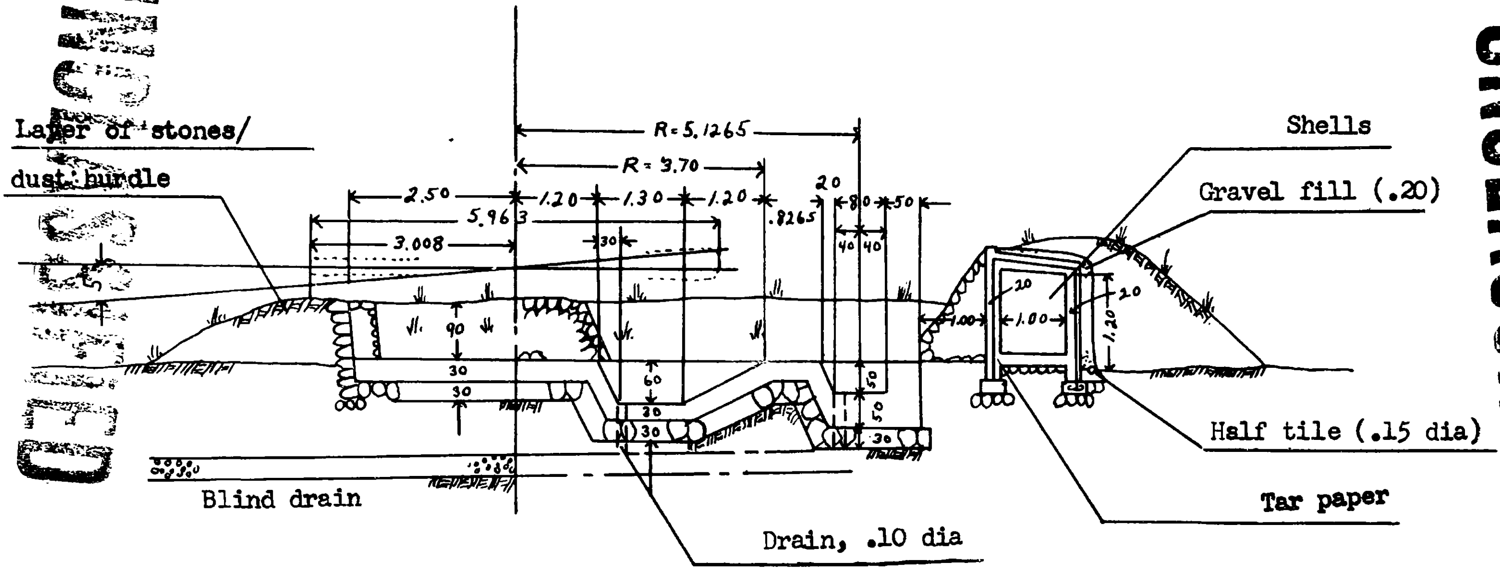


V - GUN PLATFORMS

FOR TYPE 89 15cm CANNON (Continued)

SECTION A-A

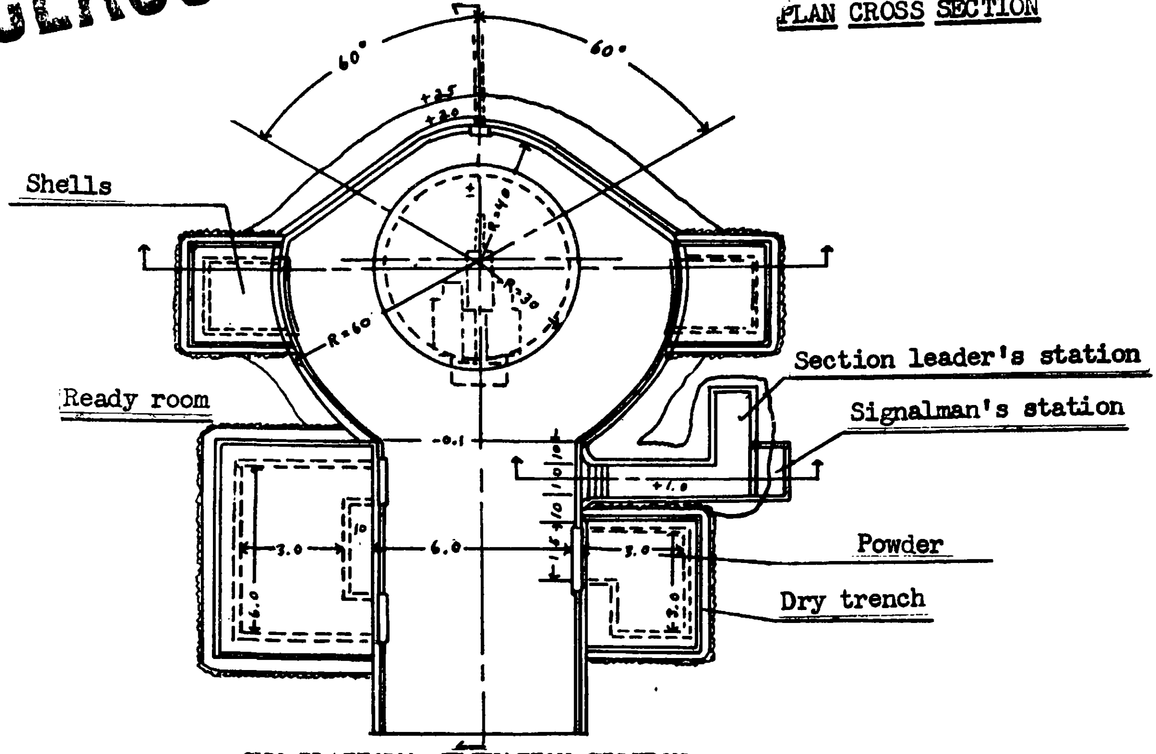
$\frac{1}{100}$



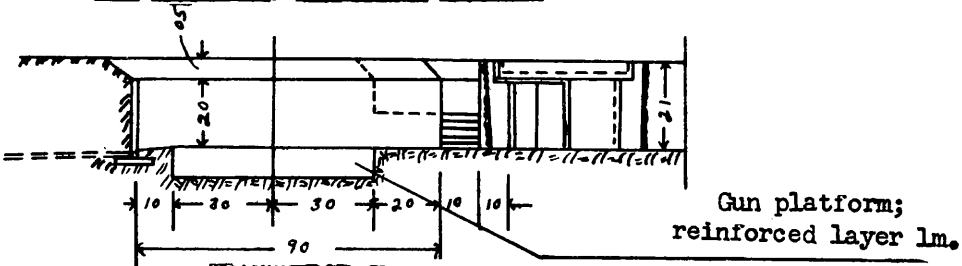
V - GUN PLATFORMS

(WITH SHELTER) - FOR HEAVY MORTAR

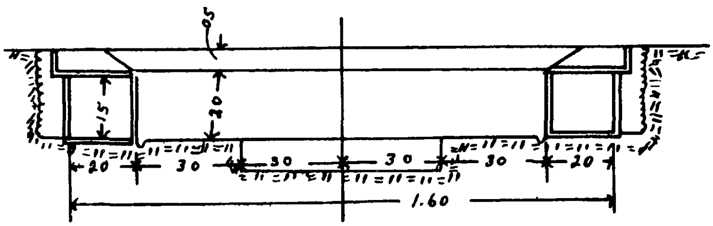
PLAN CROSS SECTION



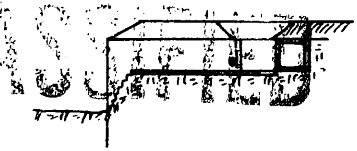
GUN PLATFORM; ELEVATION SECTION



TRANSVERSE SECTION



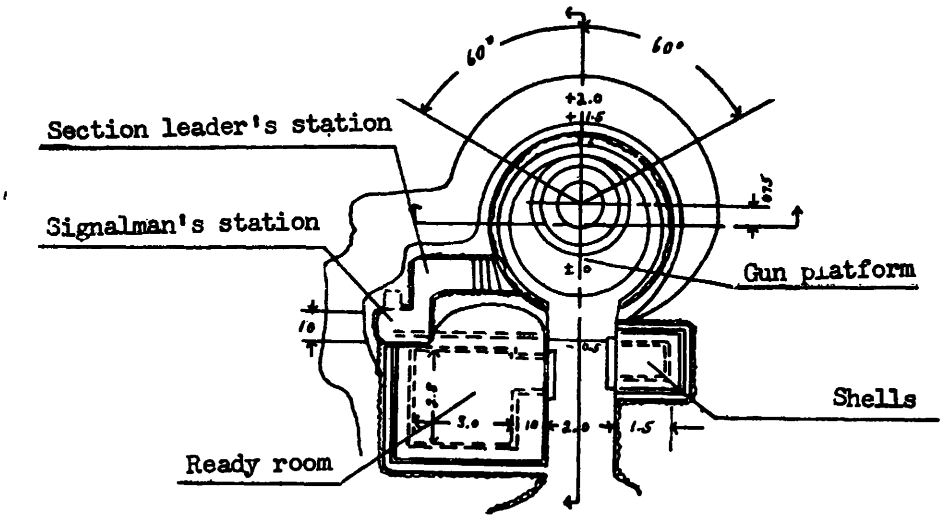
SECTION LEADER'S STATION
ELEVATION SECTION



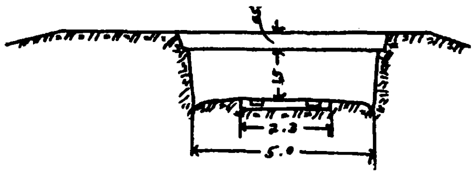
V - GUN PLATFORMS

(WITH SHELTER) - FOR MEDIUM TRENCH MORTAR

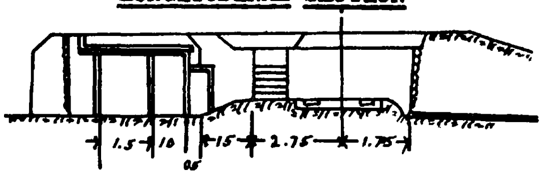
PLAN CROSS SECTION



GUN PLATFORM, TRANSVERSE SECTION



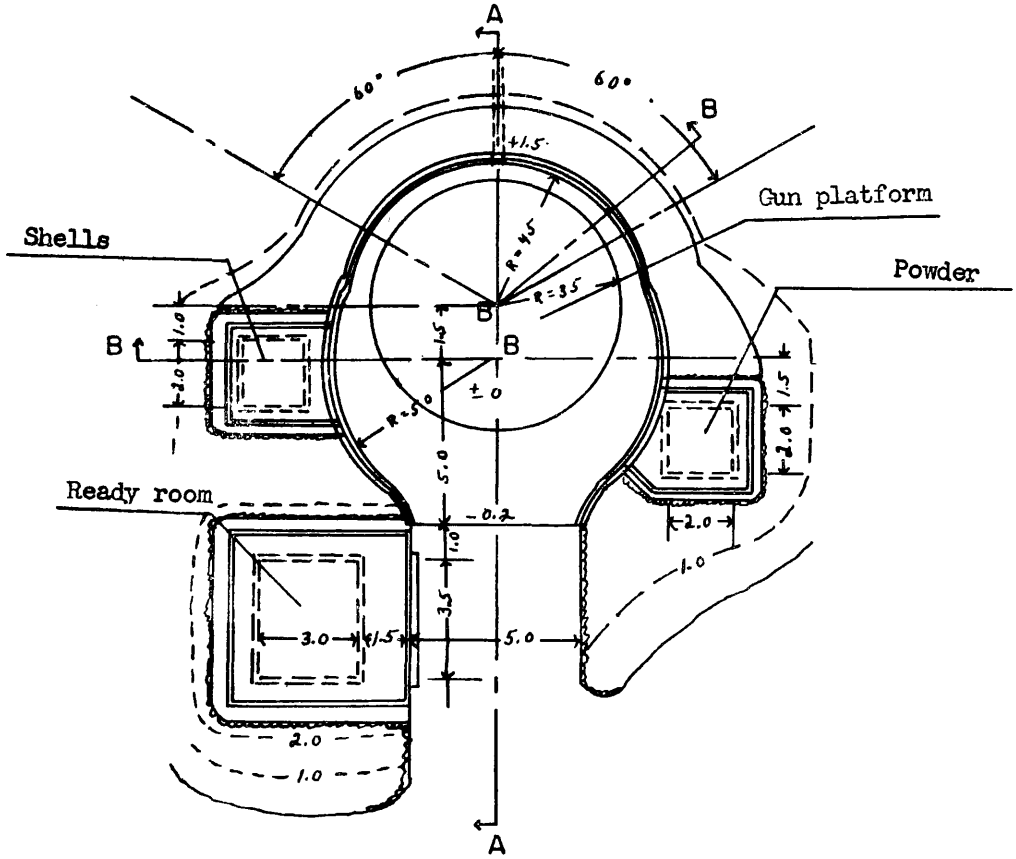
LONGITUDINAL SECTION



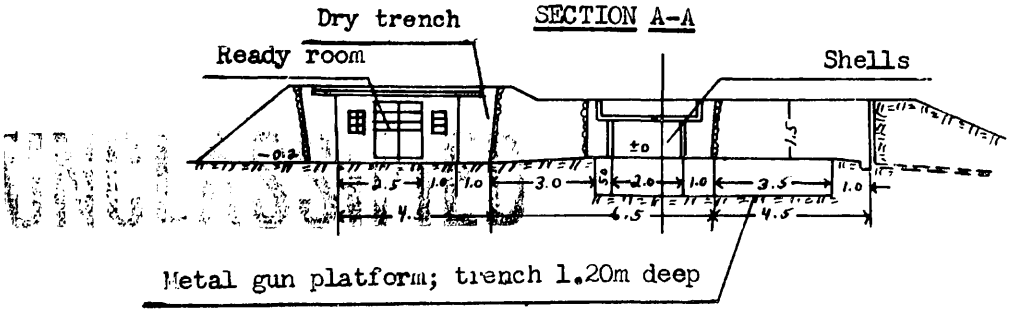
V. GUN PLATFORMS

(WITH SHELTER) - FOR TYPE 45 24cm HOWITZER

PLAN CROSS SECTION



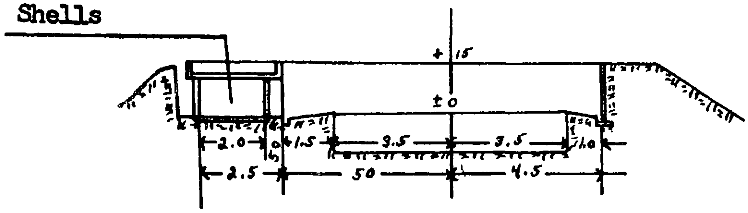
SECTION A-A



V - GUN PLATFORMS

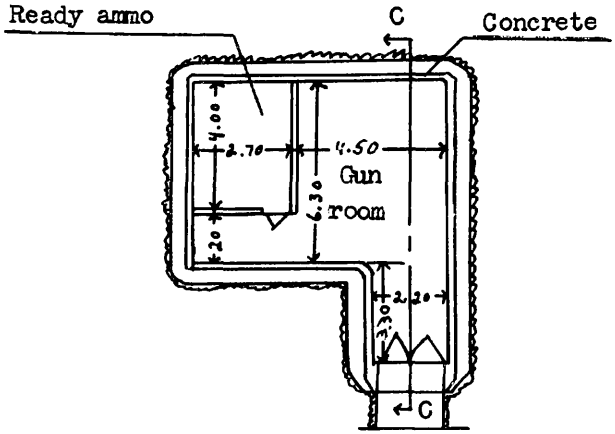
(WITH SHELTER) - FOR TYPE 45 24cm HOWITZER (Continued)

SECTION B-B

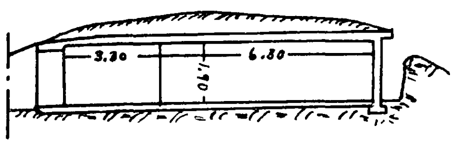


(WITH SHELTER) - FOR TWO FIELD GUNS

PLAN CROSS SECTION



SECTION C-C

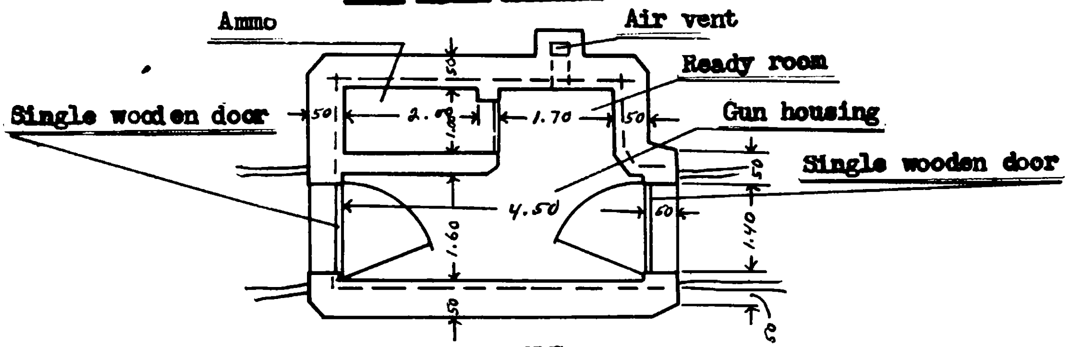


VI - READY SHELTERS

FOR ONE RAPID-FIRE GUN

(Amount of Concrete: about 35 cu m)

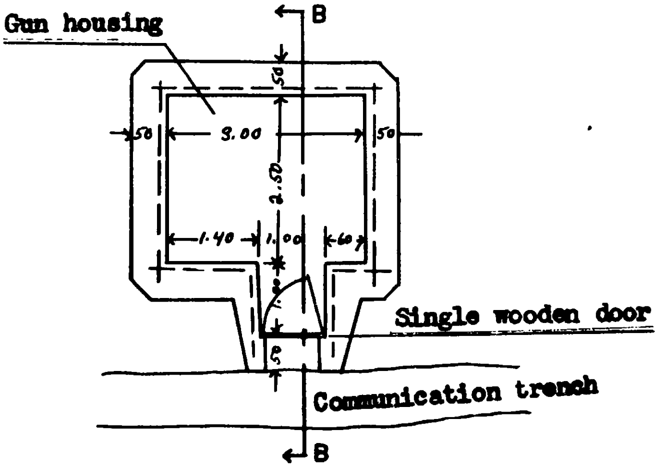
PLAN CROSS SECTION



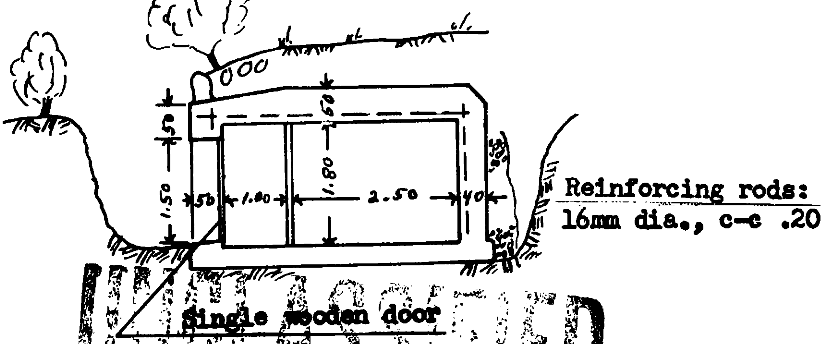
FOR HMG

(Amount of Concrete: about 27 cu m)

PLAN CROSS SECTION



SECTION B-B

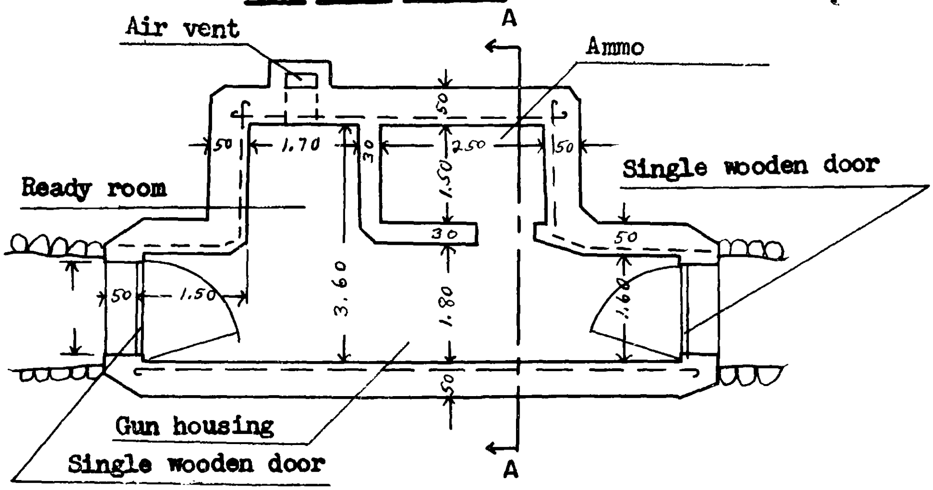


[illegible] READY SHELTERS FOR TWO RAPID-FIRE GUNS /TYPE I/

(Amount of Concrete: 50 cu m)

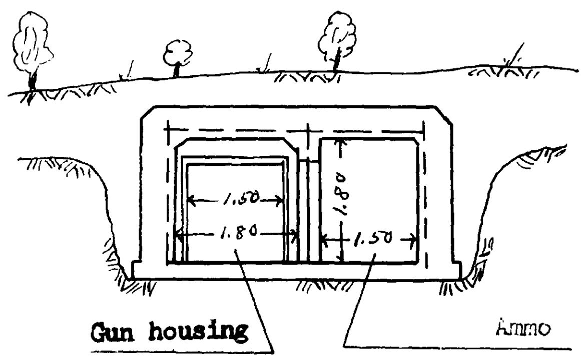
1/100

PLAN CROSS SECTION



SECTION A-A

1/100



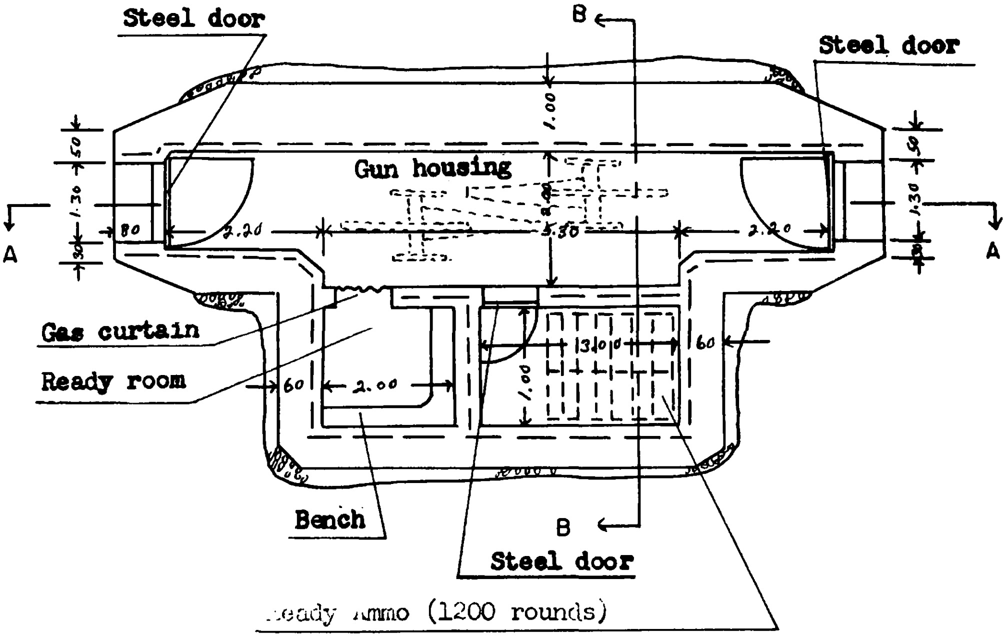
1. Where seepage is likely to be a problem, provide for drainage by adding a layer of gravel on the roof and around the sides.
2. Disposition of foundation should take into consideration factors of local soil.

Reinforcing rods: 16mm dia., c-c .20

VI - READY SHELTERS

FOR TWO RAPID-FIRE GUNS /TYPE II/

PLAN CROSS SECTION



List of Required Materials:

Concrete..............175 cu m
Steel reinforcement... 35 tons
Forms { inner.........100 sq m
 outer.........165 sq m
Broken Stone.......... 20 cu m

Accessories

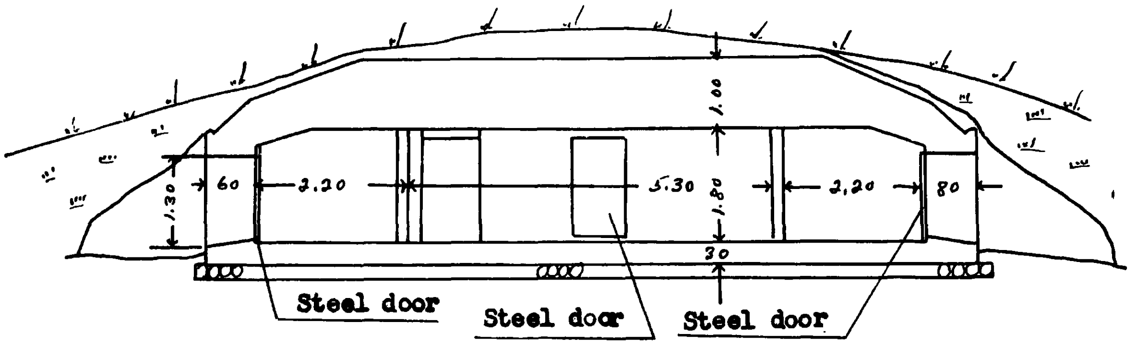
Steel doors......2
Wooden doors.....1
Gas curtain......1
Bench............1
Intake...........1
Exhaust..........1
Drainage unit....1
Miscellaneous....

Reinforcing rods: 16mm dia., c-c .20
 16mm dia., c-c .40

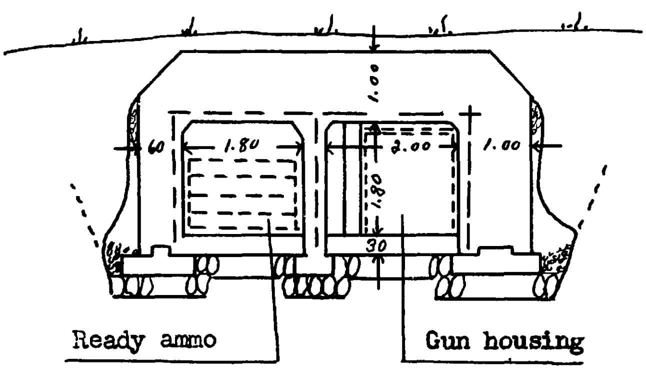
VI - READY SHELTERS

FOR TWO RAPID-FIRE GUNS /TYPE II/ (Continued)

SECTION A-A



SECTION B-B



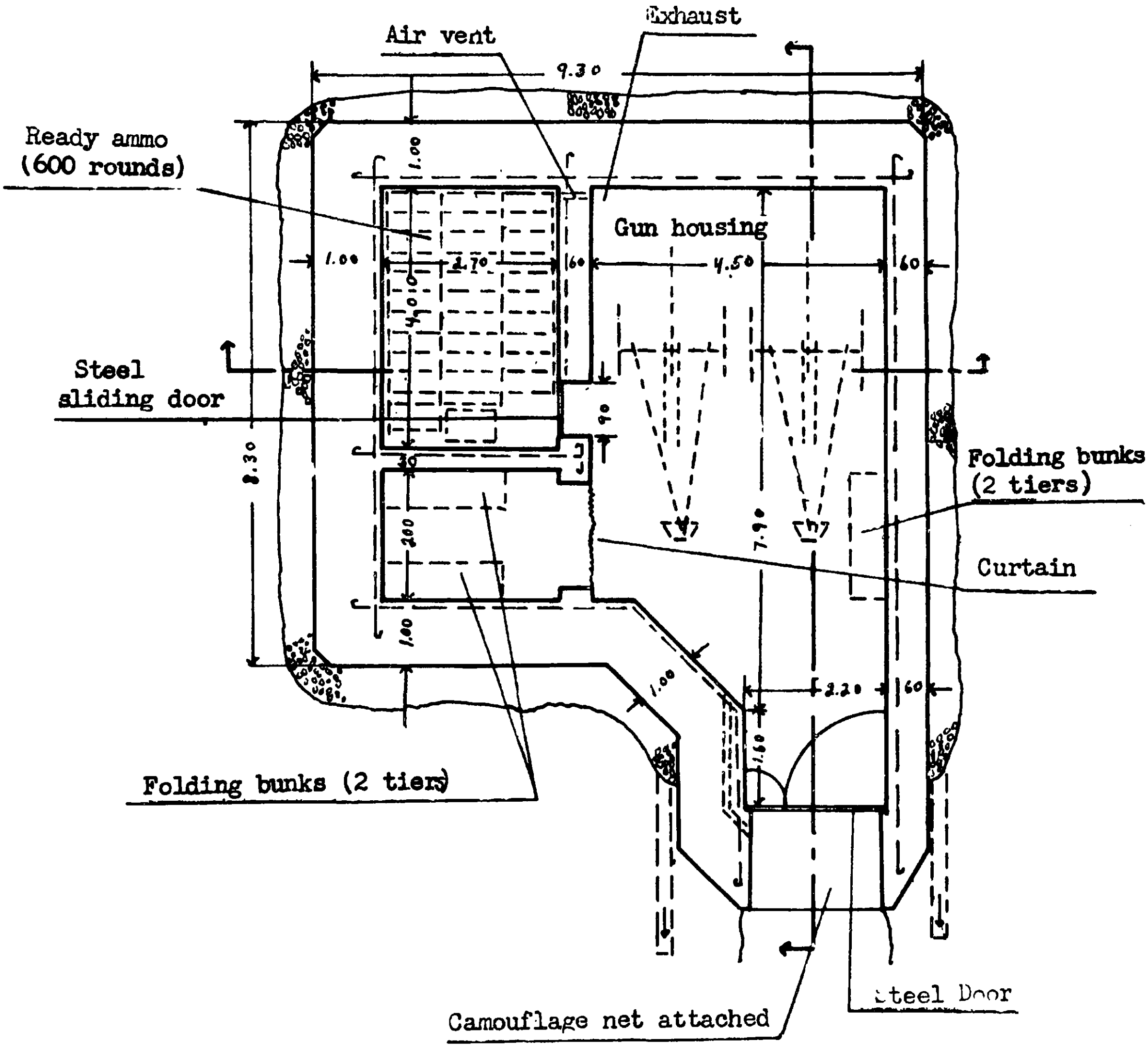
1. The diagram shows a shelter housing two Type 94 37mm rapid-fire guns.
2. This may be substituted for the customary Rapid-Fire Gun Emplacement.
3. Disposition of foundation, entrances, and drainage should take into account factors of local terrain and soil.

Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

VI - READY SHELTERS

FOR TWO FIELD (OR MT) GUNS

PLAN CROSS SECTION

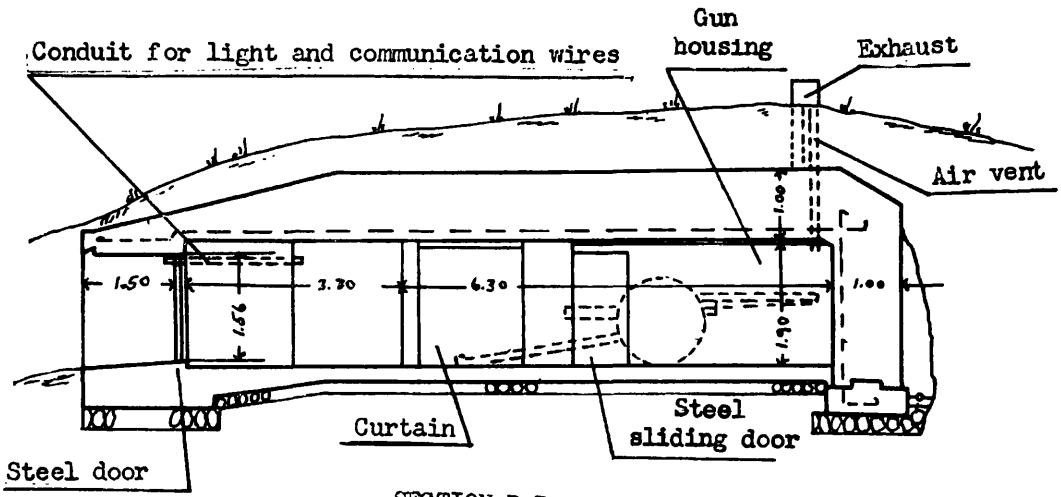


1. Diagram indicates a 2 gun shelter for Type 90 Field Gun.
2. Endeavor to conceal entrance with camouflage net.
3. Disposition of foundation, drainage, entrances, should take into account factors of local terrain and soil.

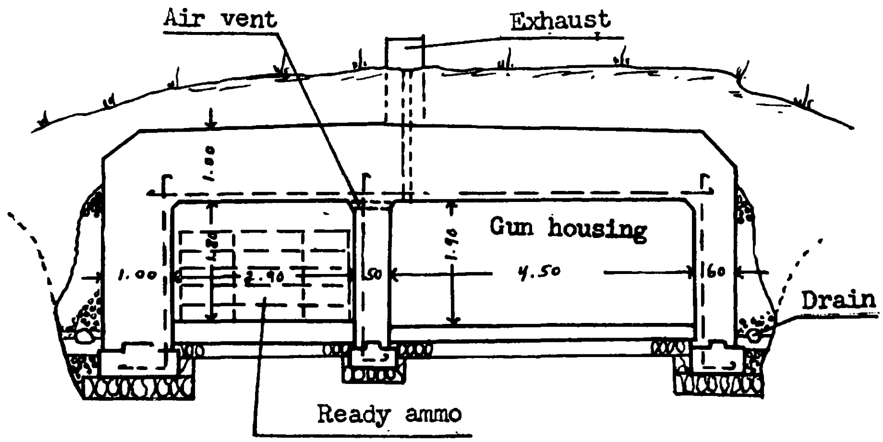
VI - READY SHELTERS

FOR TWO FIELD (OR MT) GUNS (Continued)

SECTION A-A



SECTION B-B



List of Required Materials

Concrete..................100 cu m
Steel reinforcement.......3.5 ton
Forms {inner..............155 sq m
Forms {outer..............220 sq m
Broken stone.............. 33 cu m

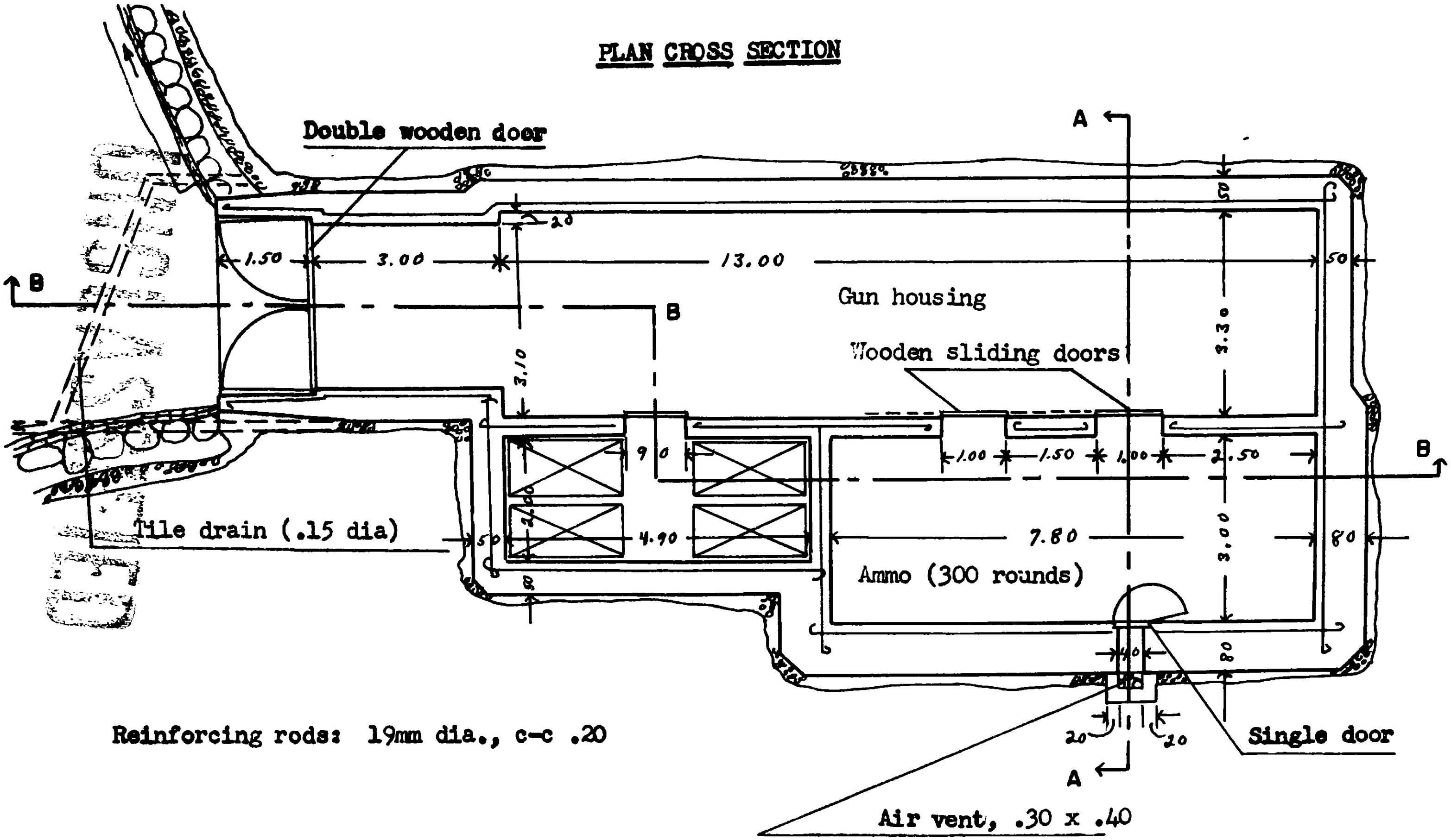
Accessories

Exhaust...............1
Steel entrance doors..2
Folding bunks.........6
Drainage unit.........1
Miscellaneous.........1

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND TRACTOR

PLAN CROSS SECTION



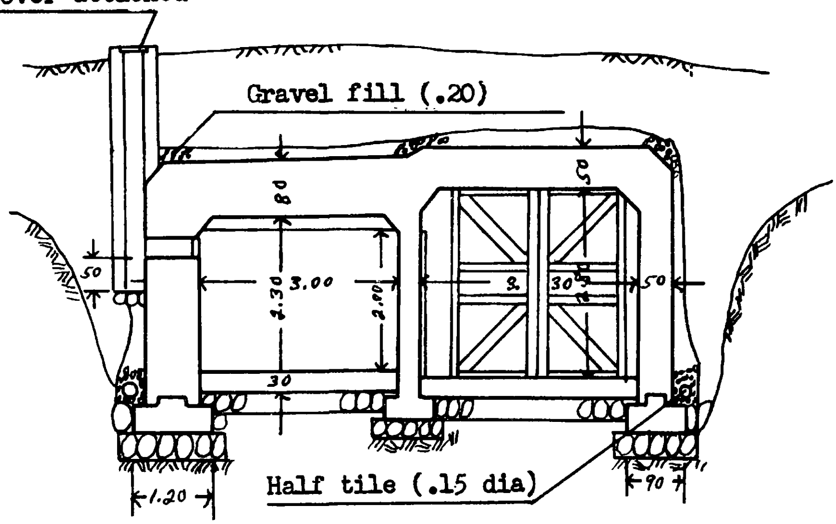
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND TRACTOR (Continued)

SECTION A-A

Air vent, .30 x .40
Concrete cover attached



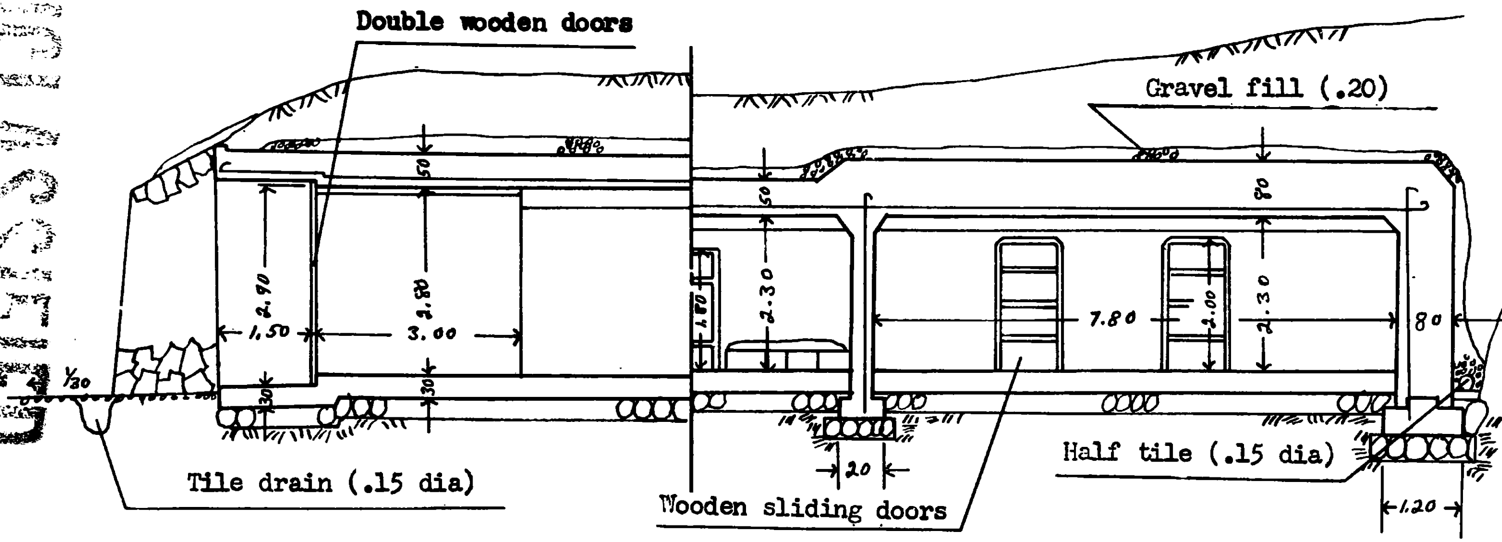
At times when it is feared the magazine will be exploded by enemy shells, build it apart from shelter. Regardless of the disposition indicated in the diagram, the foundation is adapted to the terrain.

Reinforcing rods: 19mm dia., e-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND TRACTOR (Continued)

SECTION B-B



Note:

Shows type of shelter capable of housing gun without uncoupling tractor gear.

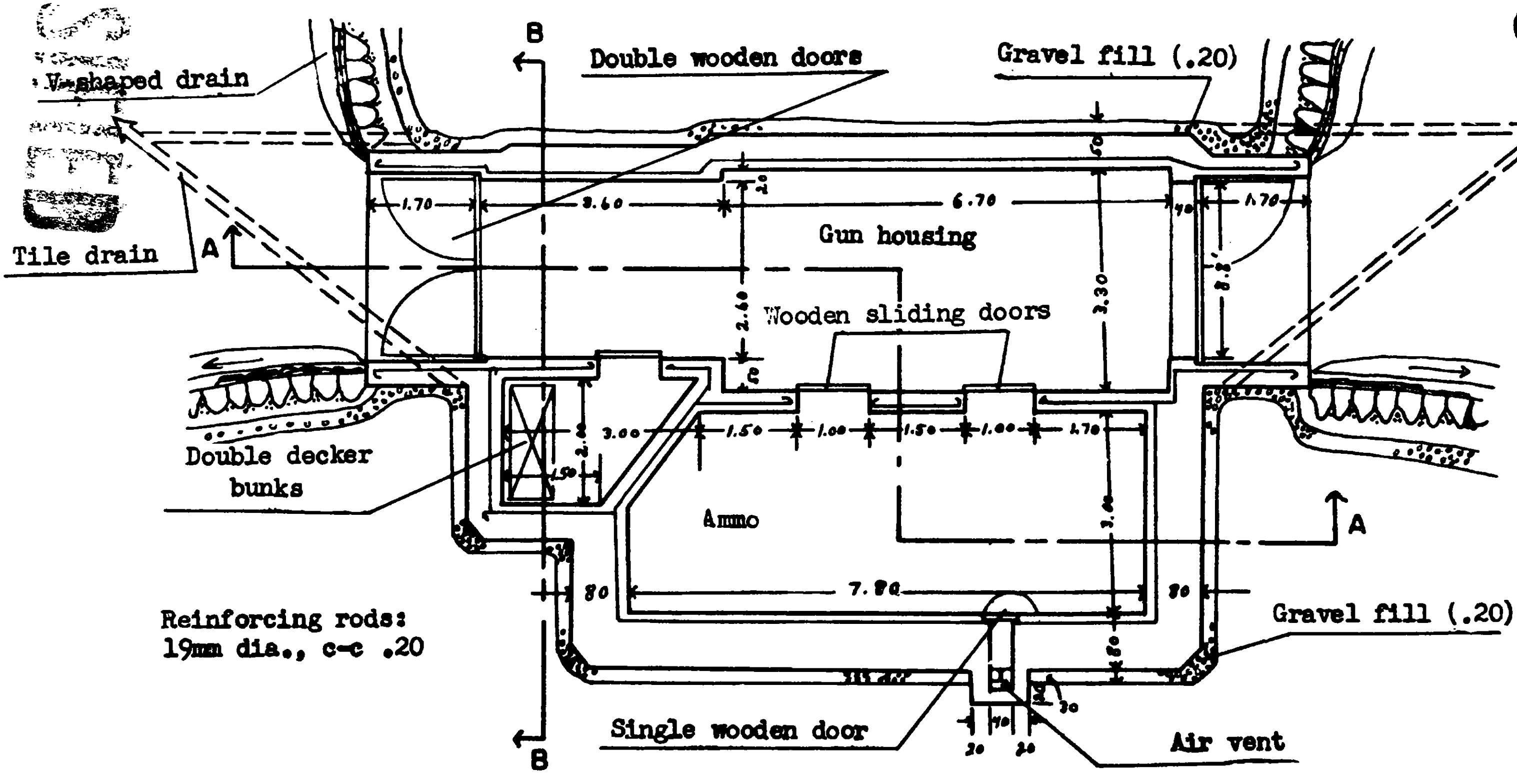
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(A) CANNON HOUSING

PLAN CROSS SECTION

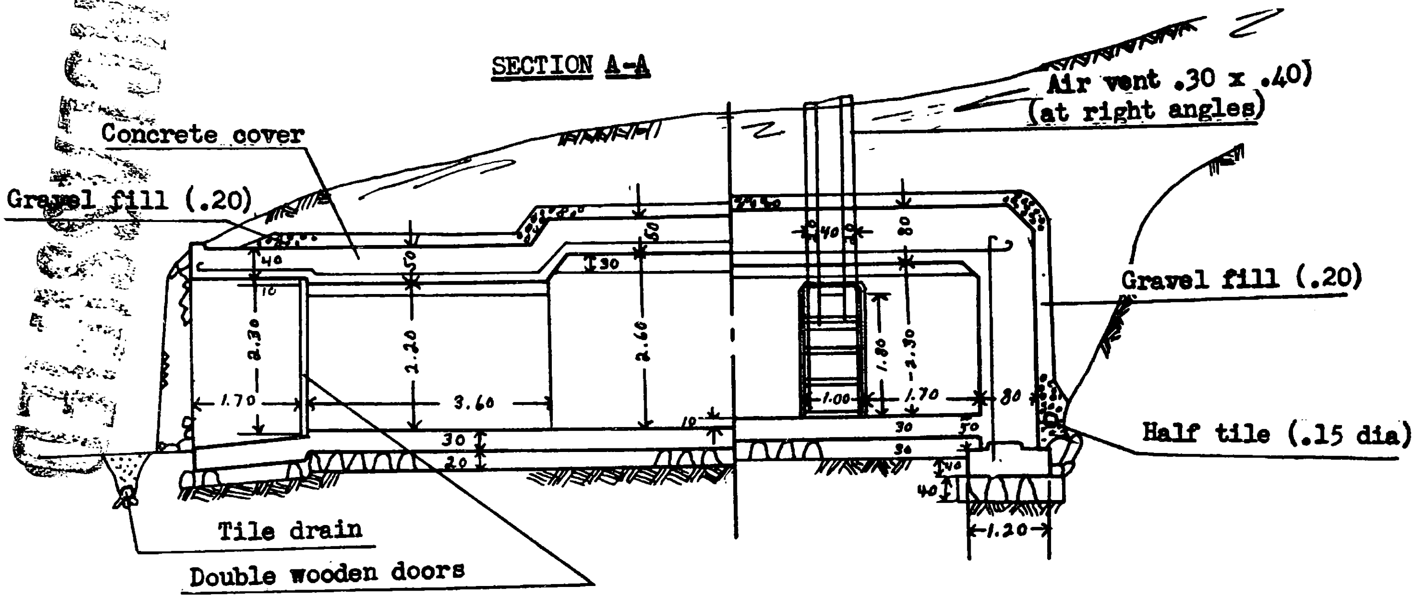


VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(A) CANNON HOUSING (Continued)

SECTION A-A



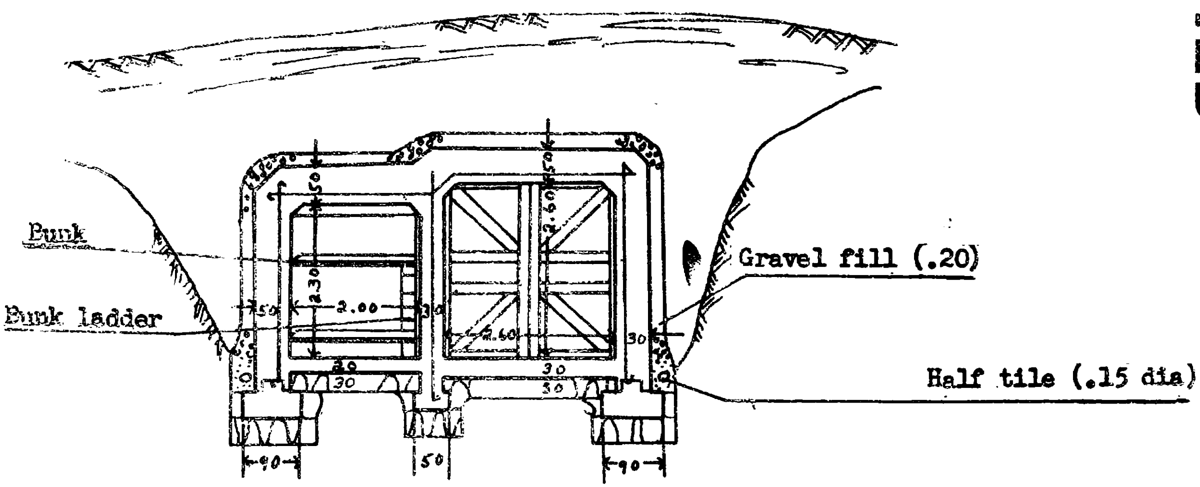
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(A) CANNON HOUSING (Continued)

SECTION B-B



1. Type housing gun.
2. At times when it is feared the magazine will be exploded by enemy bombs, separate it from casemate.
3. Regardless of the disposition in the diagram, foundation is adopted to local terrain.

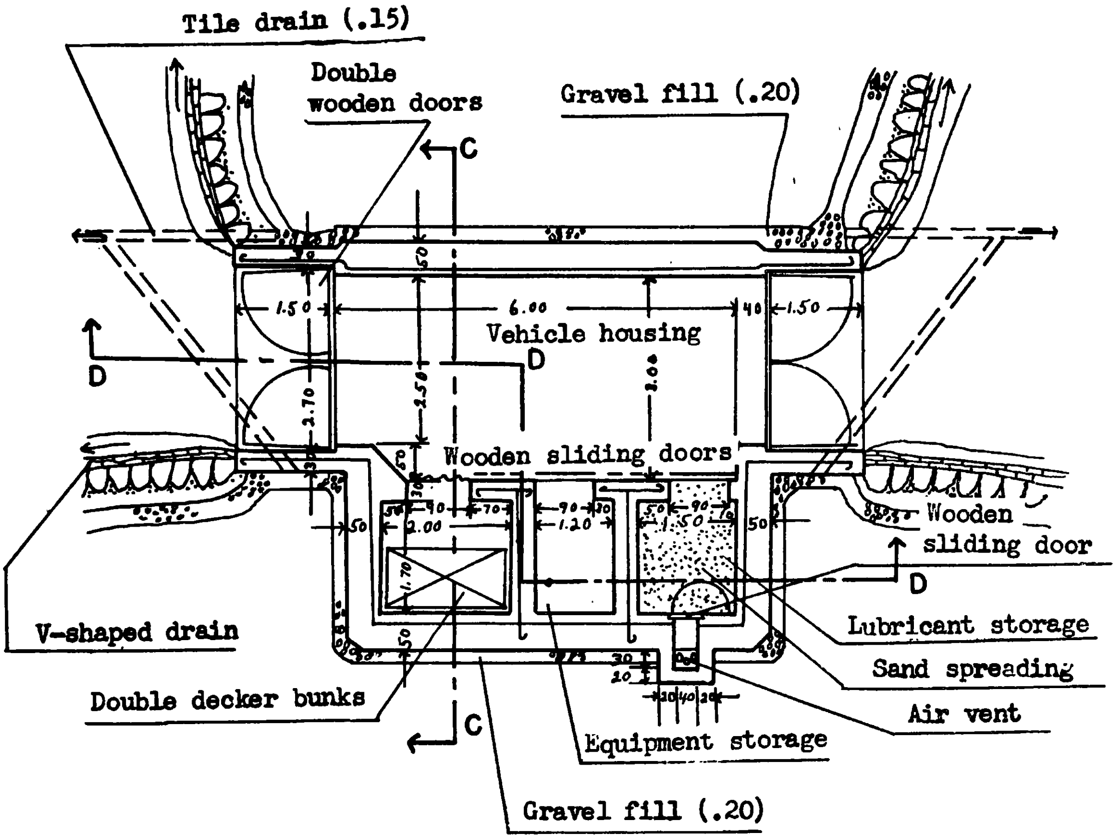
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 [illegible] CANNON AND FOR TRACTOR

(B) TRACTOR HOUSING

PLAN CROSS SECTION



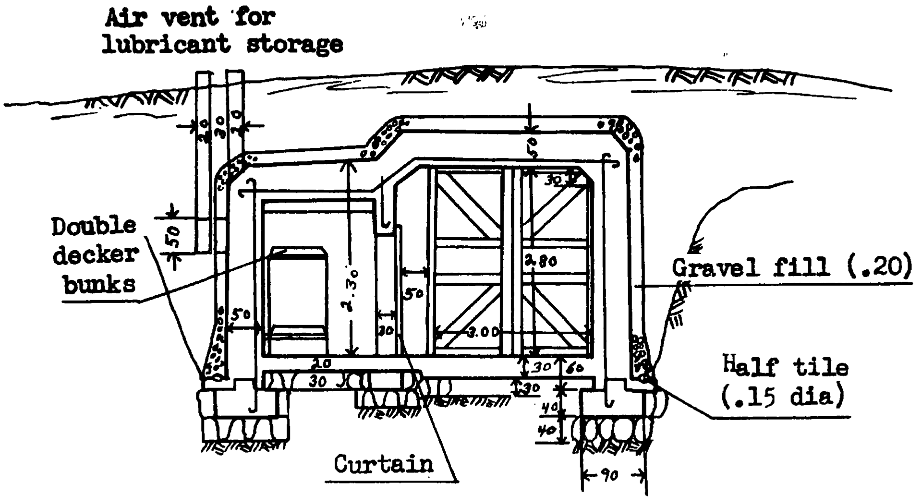
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

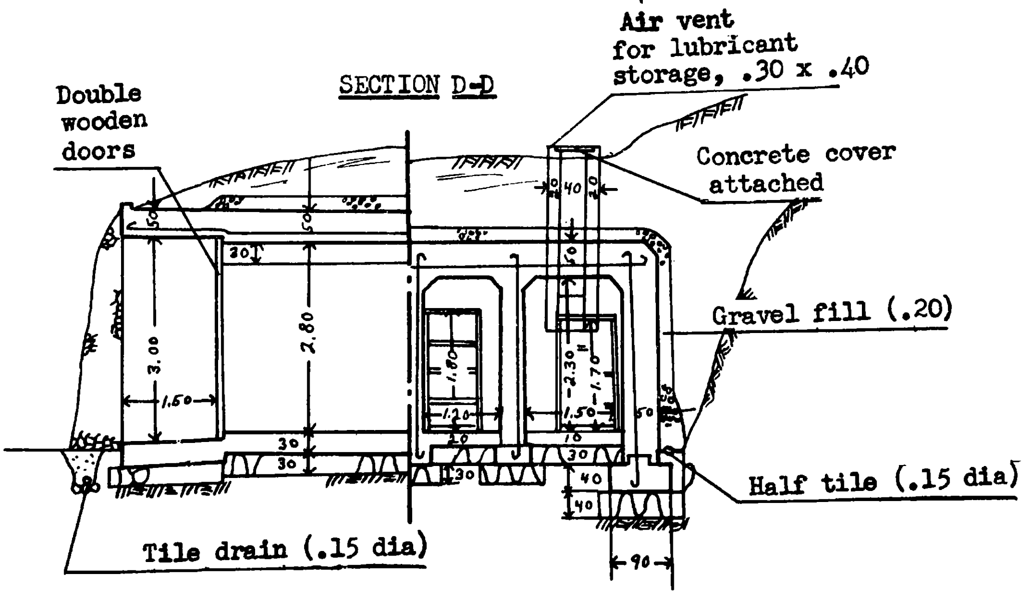
FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(B) TRACTOR HOUSING (Continued)

SECTION C-C



SECTION D-D

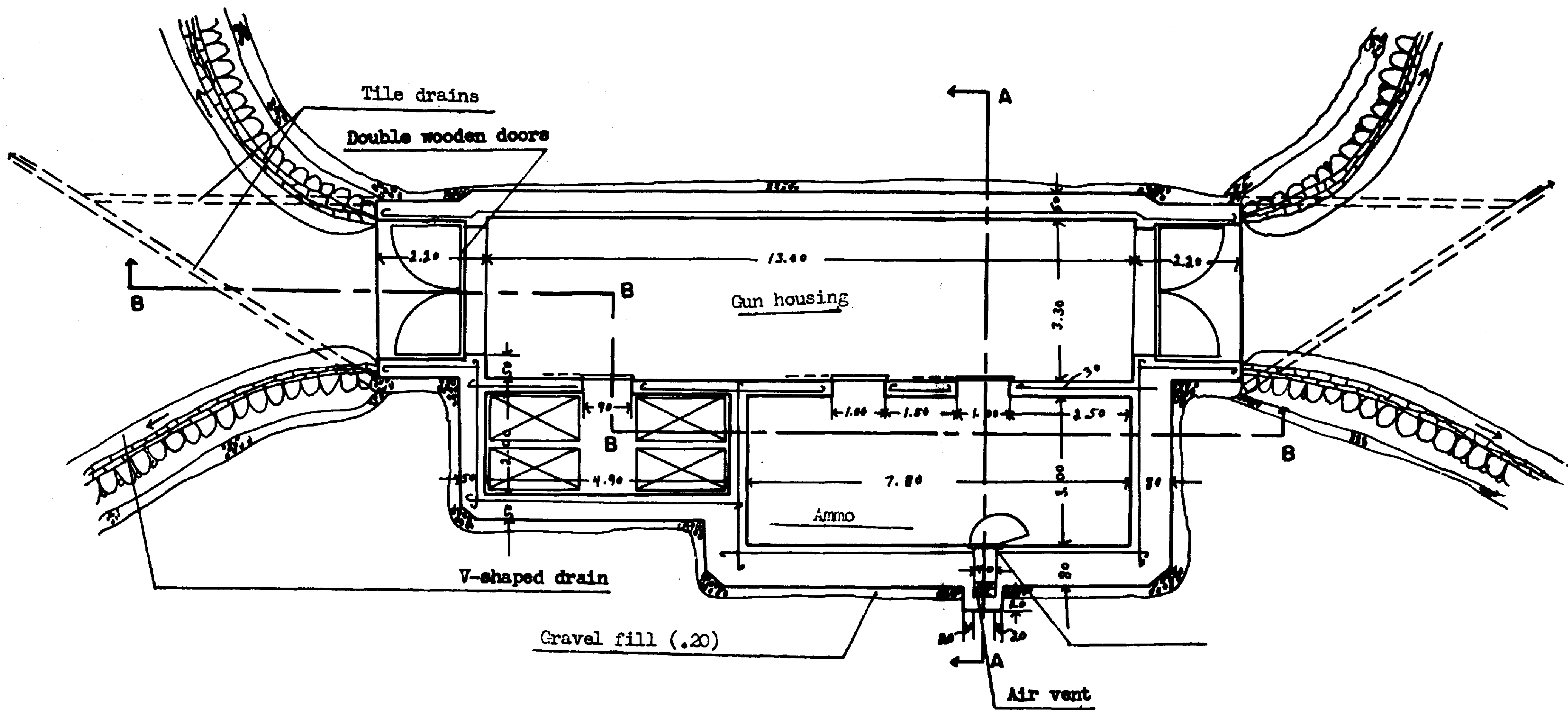


Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND TRACTOR

PLAN CROSS SECTION

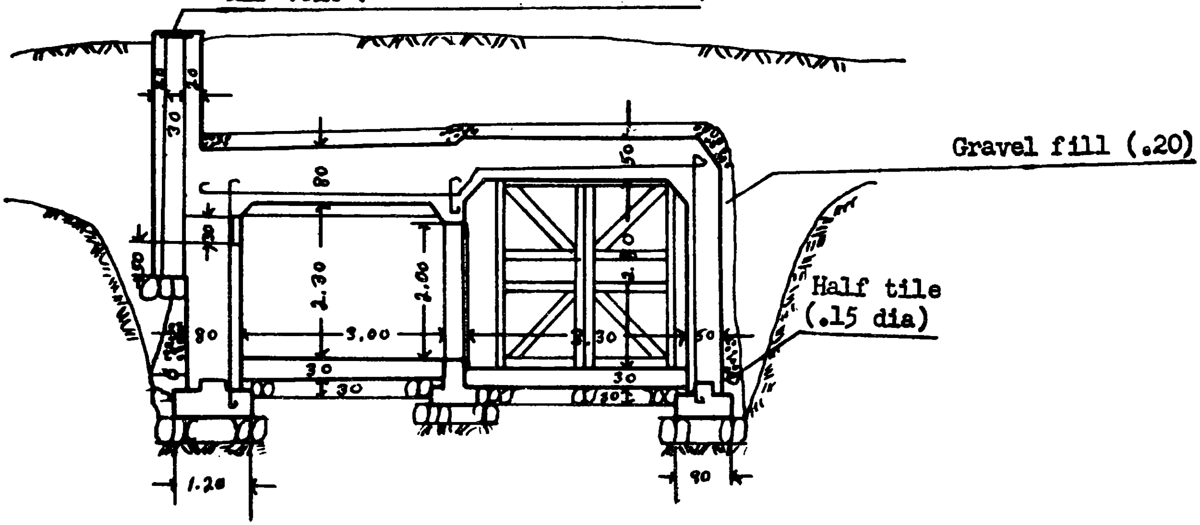


Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND TRACTOR (Continued)

SECTION A-A



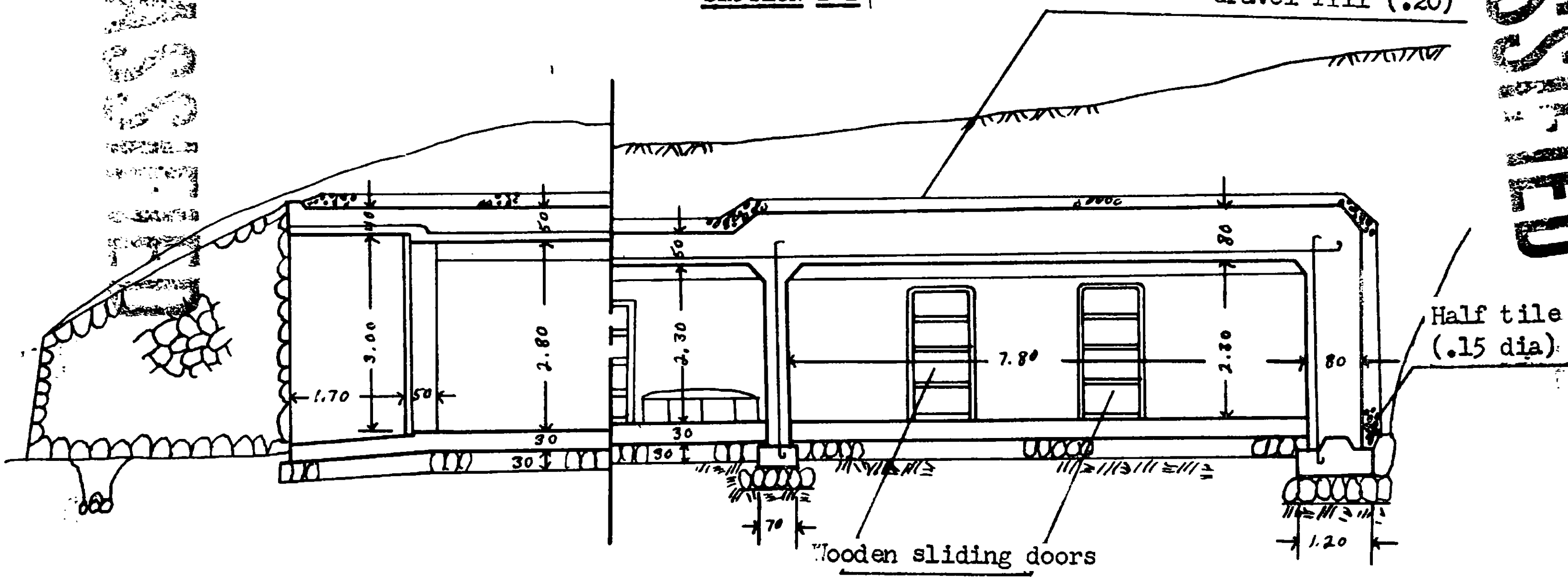
Reinforcing rods: 19mm dia., c-c .20

UNCLASSIFIED

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND TRACTOR (Continued)

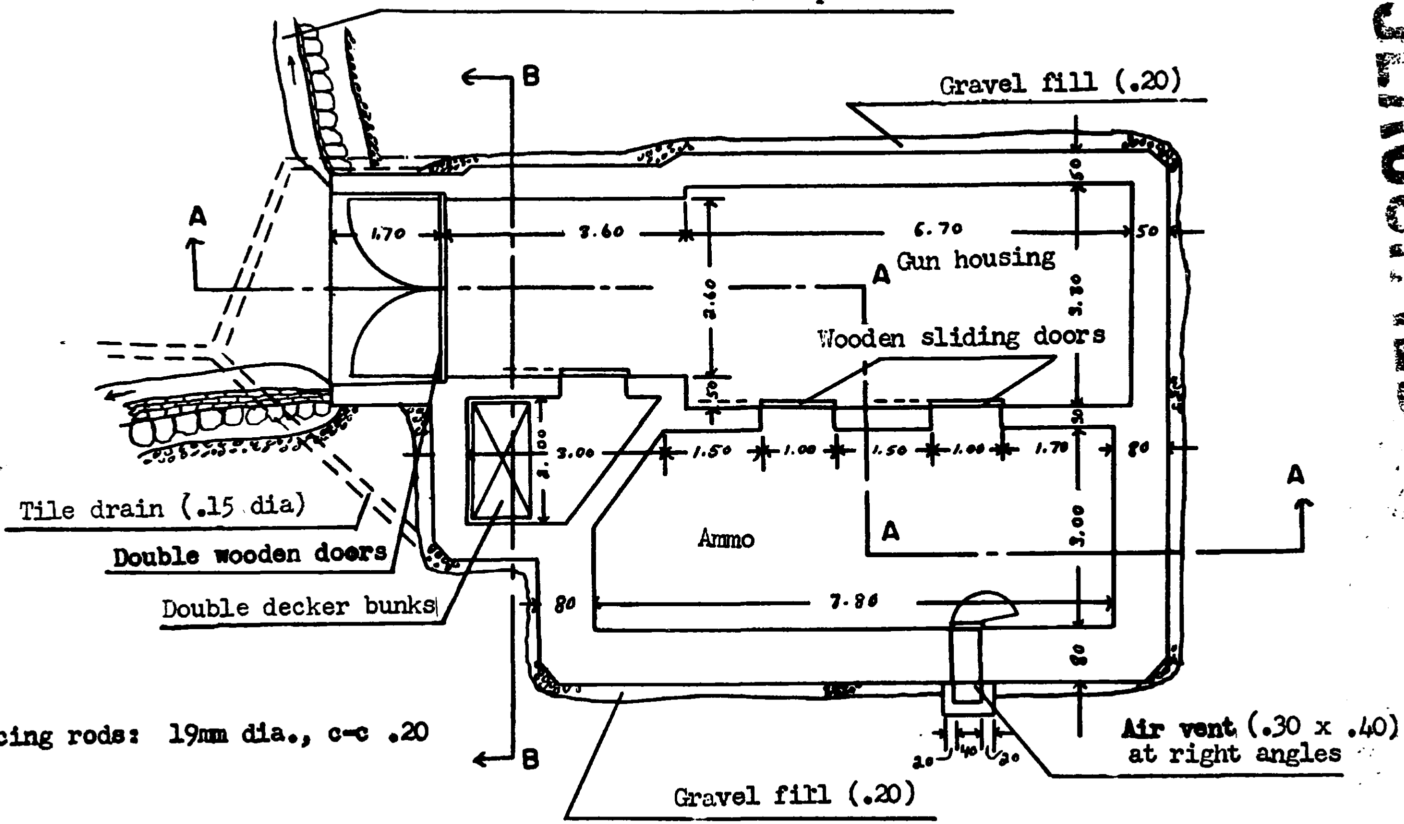
SECTION B-B



Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS
FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(A) CANNON HOUSING
PLAN CROSS SECTION



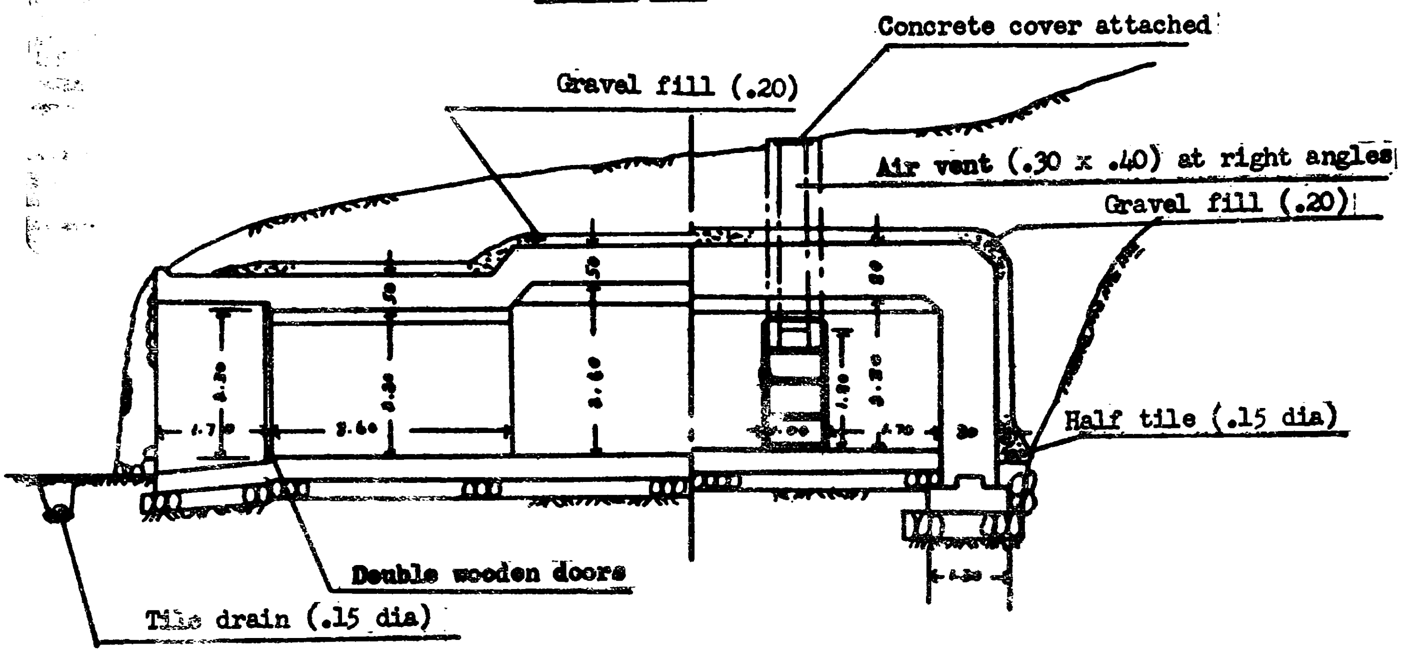
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(A) CANNON HOUSING (Continued)

SECTION A-A



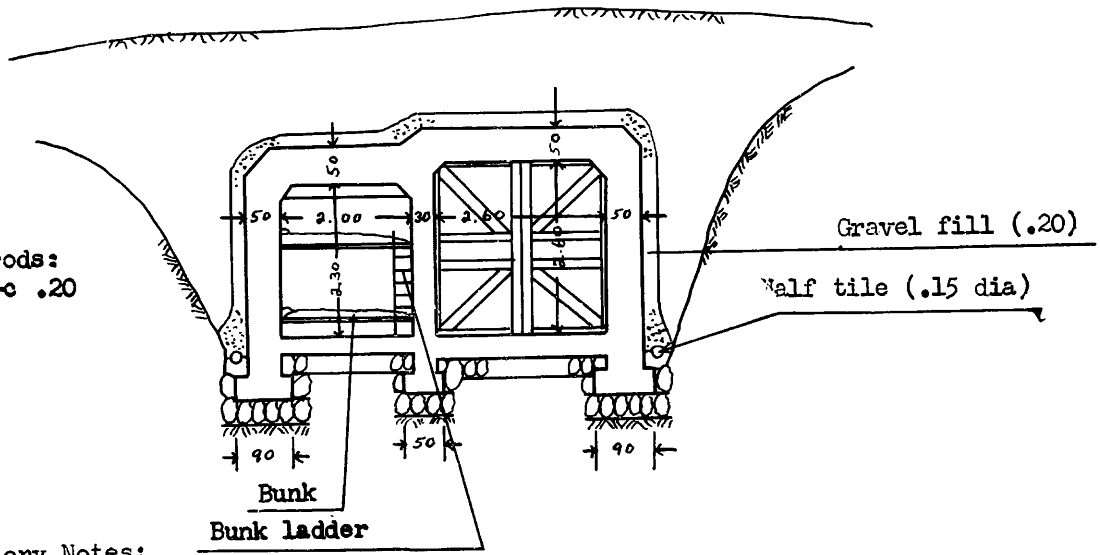
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(A) CANNON HOUSING (Continued)

SECTION B-B



Explanatory Notes:

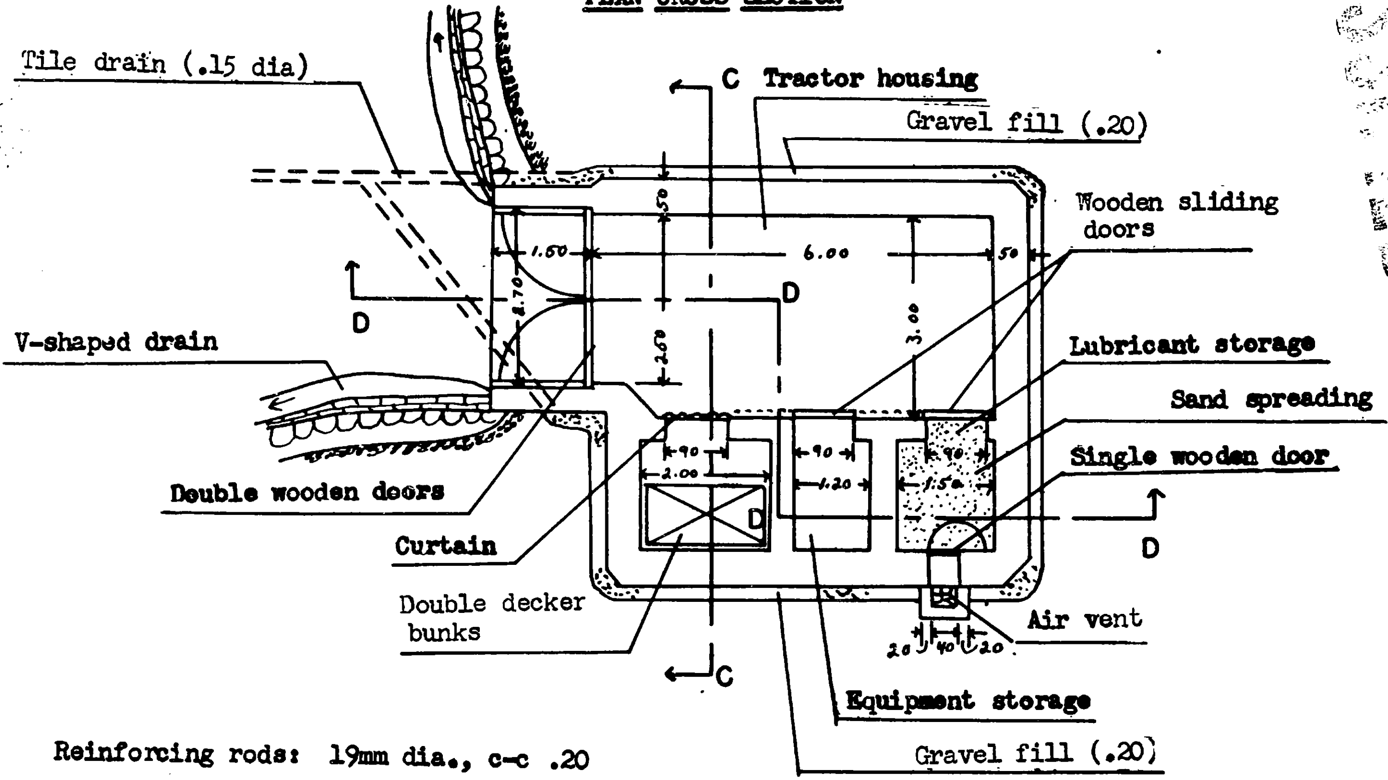
1. At times when it is feared that the magazine will be exploded by enemy bombs, build it apart.
2. Regardless of the disposition in the diagram, the foundation is adapted to the terrain.

VI - READY SHELTERS

FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(B) TRACTOR HOUSING

PLAN CROSS SECTION



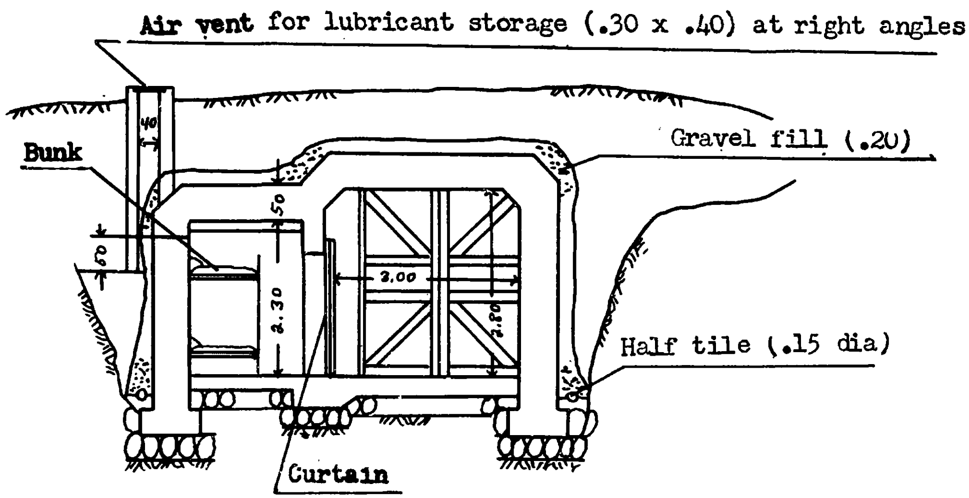
Reinforcing rods: 19mm dia., c-c .20

VI - READY SHELTERS

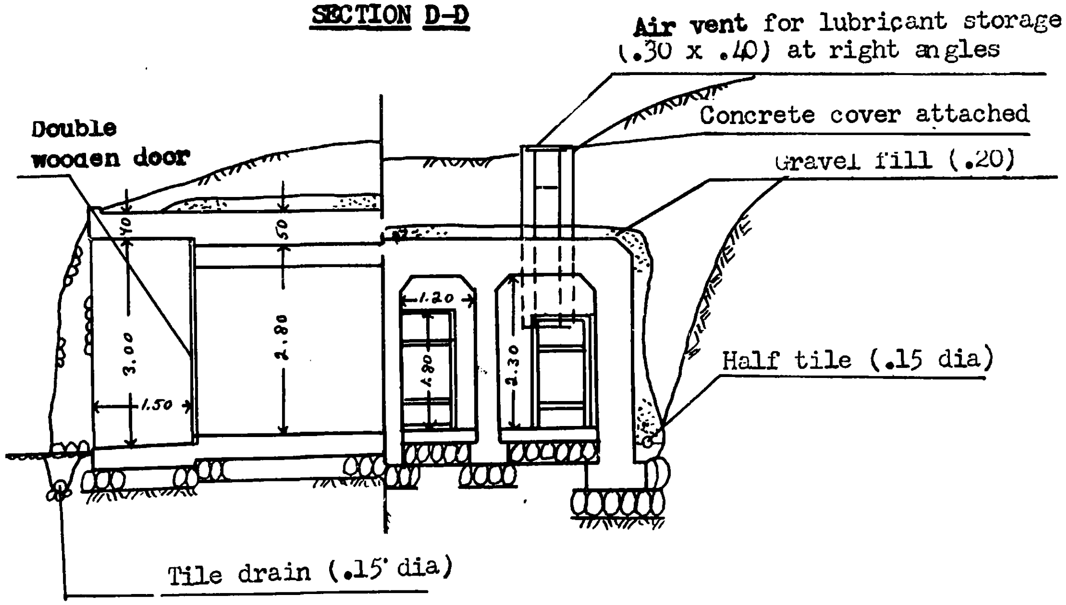
FOR TYPE 89 15cm CANNON AND FOR TRACTOR

(B) TRACTOR HOUSING (Continued)

SECTION C-C



SECTION D-D

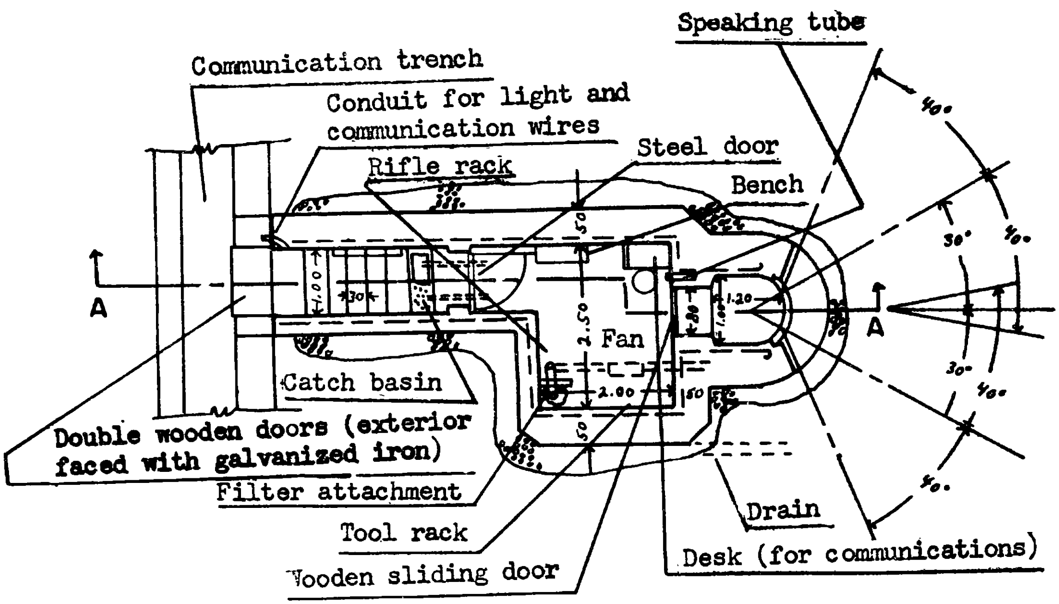


Reinforcing rods: 19mm dia., c-c .20

VII - OBSERVATION POSTS

/TYPE I/

PLAN CROSS SECTION

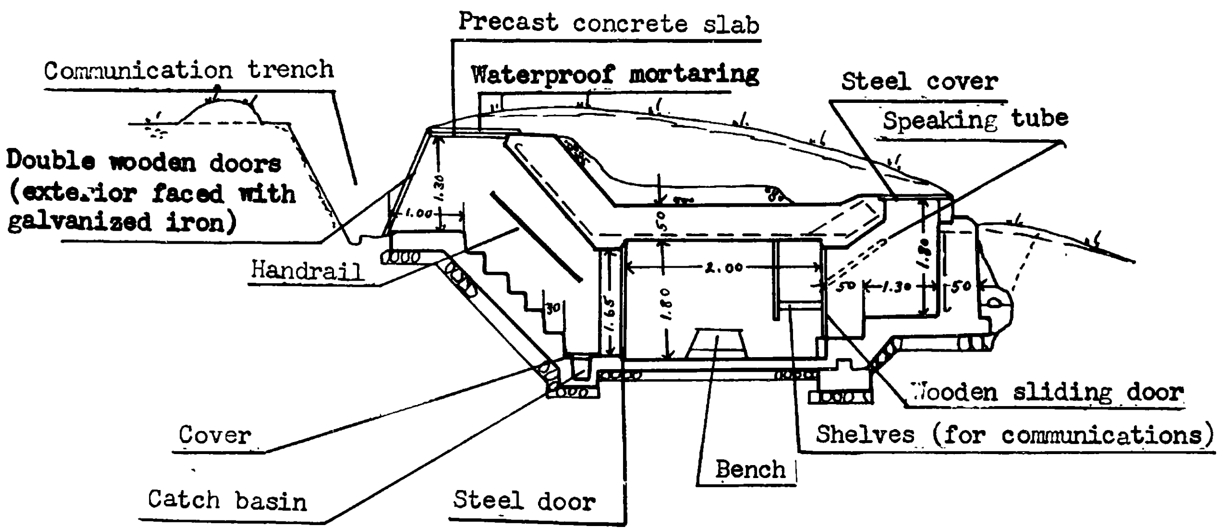


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

VII - OBSERVATION POSTS

/TYPE I (Continued)/

SECTION A-A



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

VII - OBSERVATION POSTS

/TYPE I (Continued)/

Notes:

1. Disposition of foundation, drainage, and entrances should take into account factors of local terrain and soil.

2. Provide sufficient drainage slope in the bottom of the communications trench near the O.P. entrance, to prevent seepage.

3. If necessary, use concrete cover for O.P. instead of steel.

List of Required Materials

Item	Quantity
Concrete	31 cu m
Steel Reinforcement	1.2 tons
Forms: inner	50 sq m
Forms: outer	90 sq m
Broken Stone	10 cu m

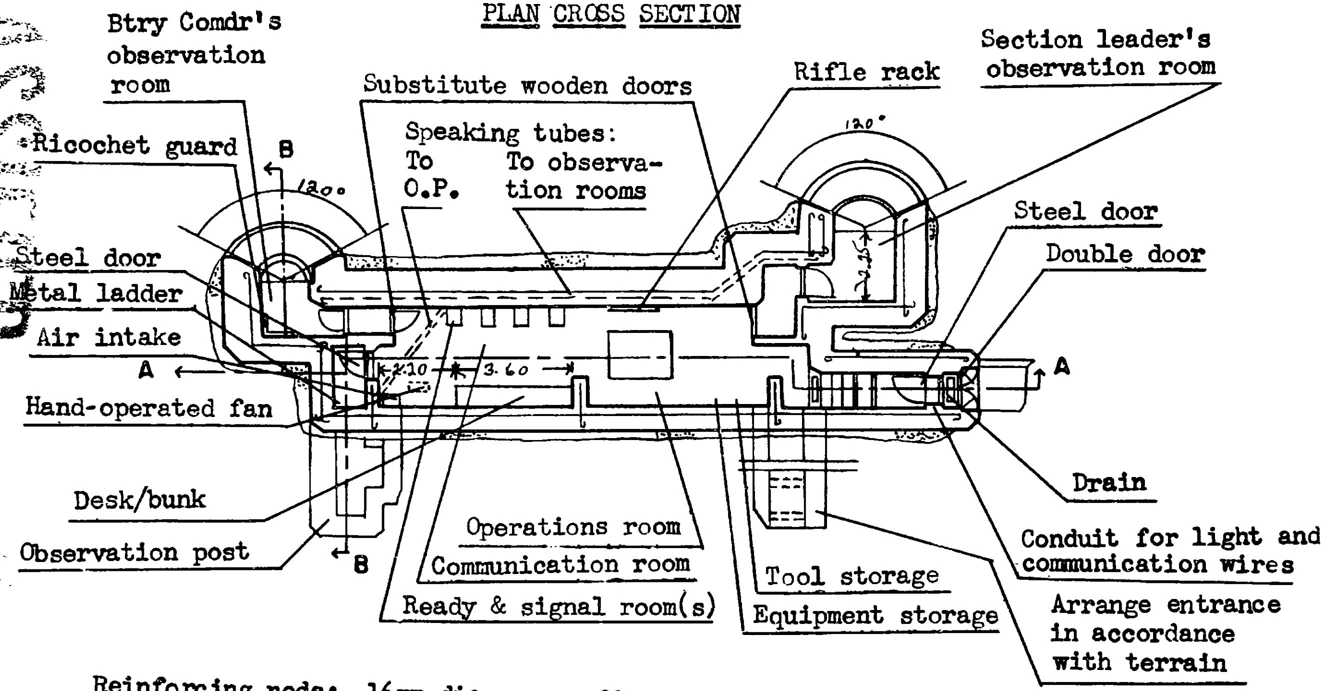
Accessories

Item	Quantity
Steel cover	1
Entrance door, steel	1
Entrance door, wooden	1
Communications Room desk	1
Communications Room chair	1
Bench	1
Rifle and tool rack	1
Board partition	1
Exhaust	1
Intake	1
Handrail	1
Drain cover	1
Speaking tube	1
Drainage unit	1
Miscellaneous	

VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTERY

PLAN CROSS SECTION

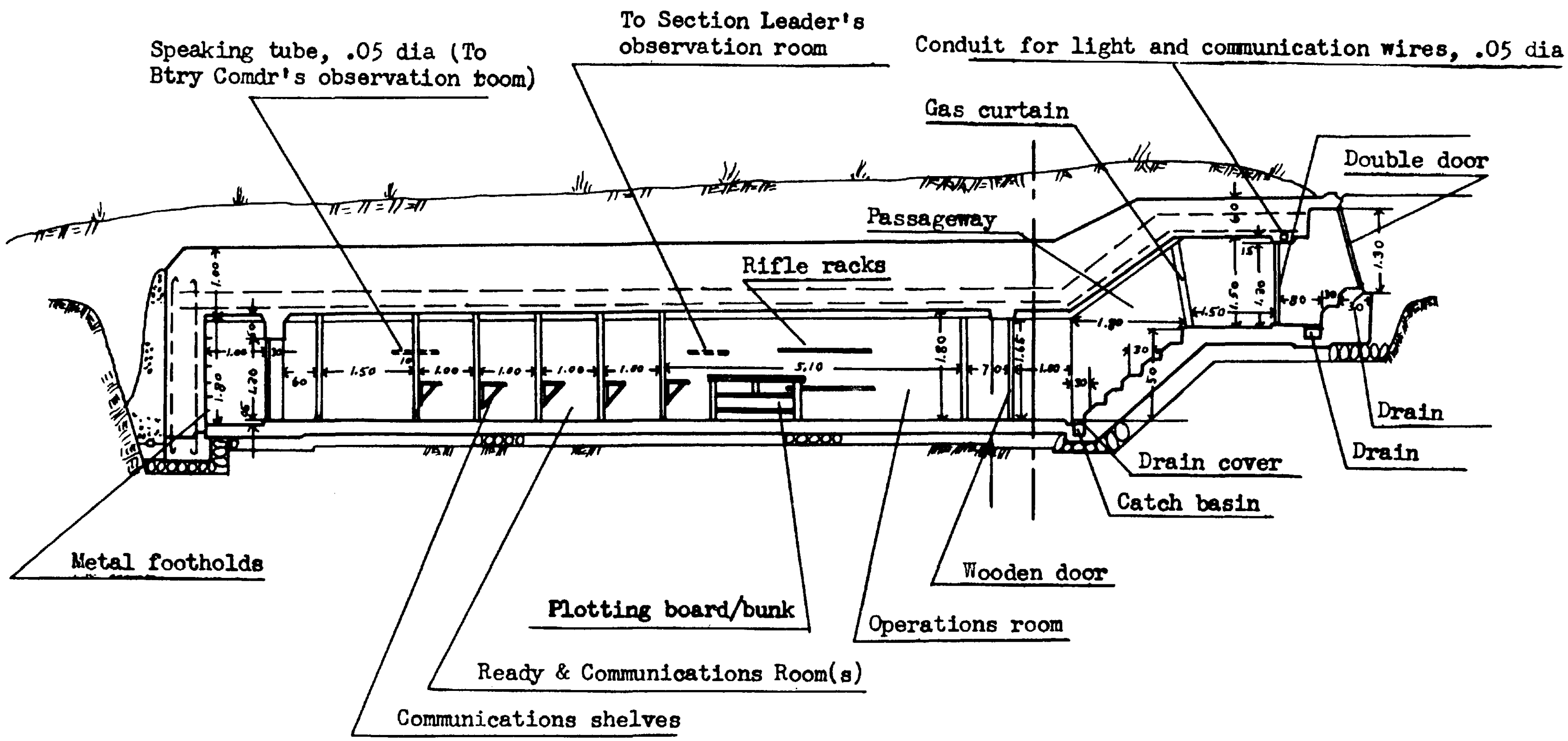


Reinforcing rods: 16mm dia., c-c .20
9mm dia., c-c .40

VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTERY (Continued)

1/100 SECTION A-A

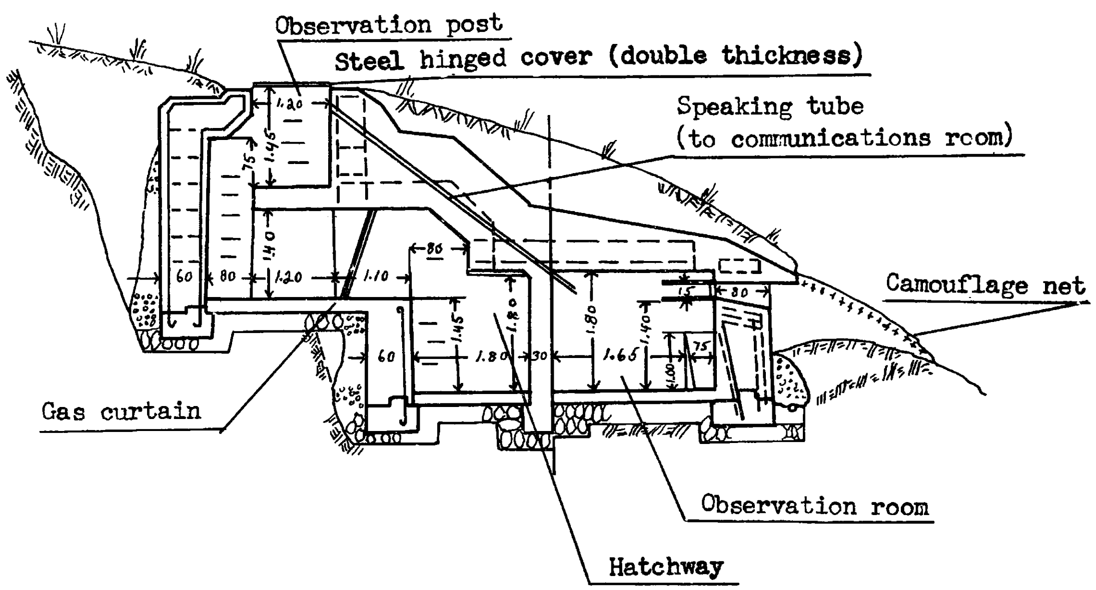


Reinforcing rods: 16mm dia., c-c .20

VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTERY (Continued)

SECTION B-B



Reinforcing rods: 9mm dia., c-c .40
16mm dia., c-c .20

VII OBSERVATION POSTS

ARTILLERY O.P. - BATTERY (Continued)

Notes:

1. Although the Observation Room in the diagram is contiguous to the main O.P., it may be independently entrenched in a forward position or to the side.

2. Build Observation Room with a 120° field of vision. In cases where a greater field is required, increase the number of Observation Rooms.

3. If the field of vision is limited, construct an independent (open) O.P. which will connect with underground passageways.

4. If observation ports are not used for 1 meter heavy (field) range finder, convert them to fire ports.

5. Entrance-way should extend slightly from the passageway and should be constructed at right angles to it; entrance and communications trench should be camouflaged.

6. When boarding is installed in the rear wall of the Observation Room (as a ricochet guard) space should be left to allow for a layer of wall-board to reduce sound within the shelter.

List of Required Materials

Item	Quantity
Concrete	270 cu m
Steel Reinforcement	90 tons
Forms, inner	225 sq m
Forms, outer	330 sq m
Broken Stone	40 cu m

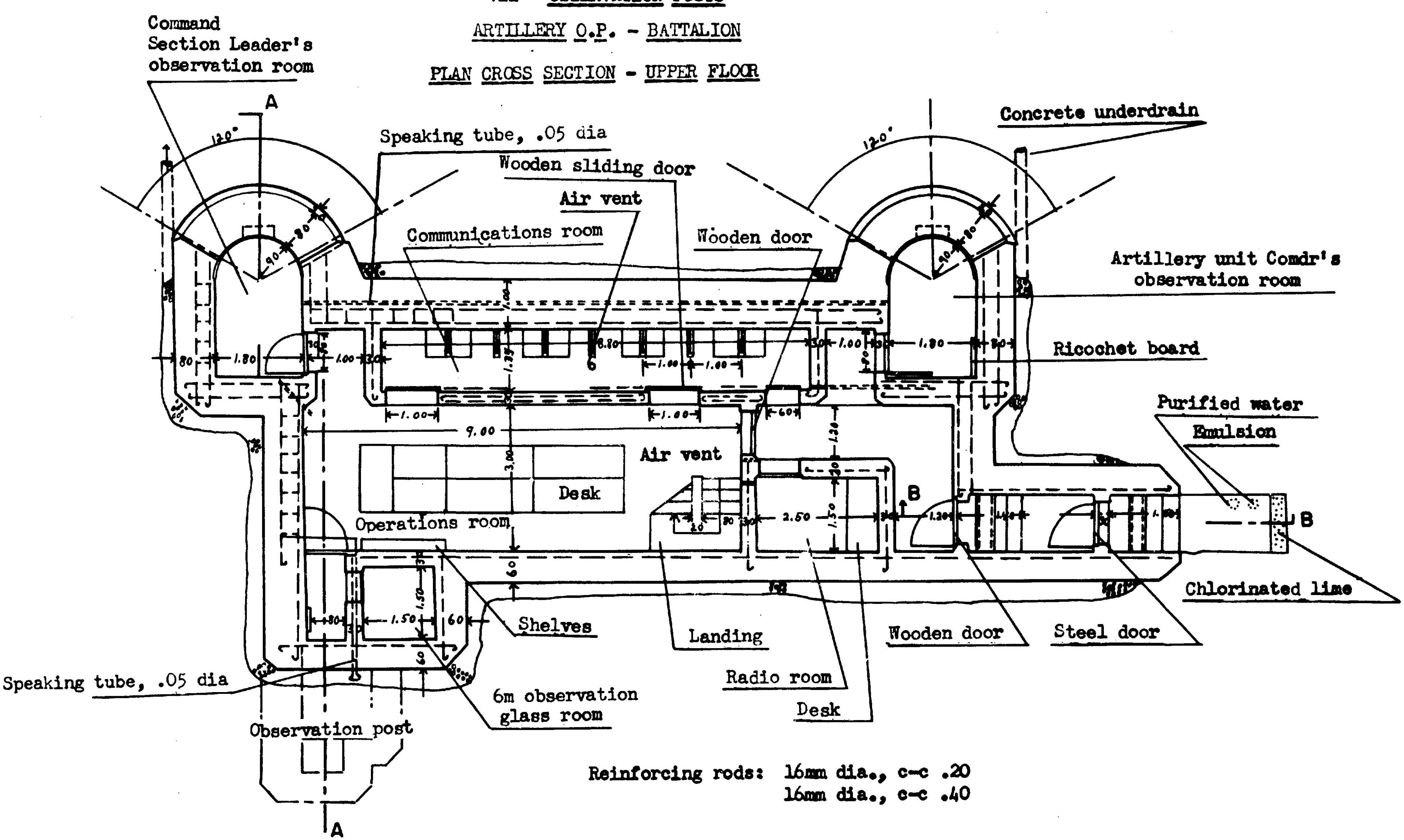
Accessories

Item	Quantity
Observation ports	2
Entrance doors, steel	4
Entrance doors, wooden	2
Gas curtains	2
Combination desk & bunk	1
Rifle and tool racks	1
Steel covers	1
Communications Room partitions	5
Communications Room desks	3
Communications Room benches	5
Intake	1
Exhaust	1
Plotting board	1
Chairs	1
Speaking tube	1
Board cover	1
Drainage unit	1
Drain cover	2
Metal ladders	3
Miscellaneous	

VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTALION

PLAN CROSS SECTION - UPPER FLOOR



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

List of Required Materials

Concrete	400 cu m
Steel Reinforcement	155 tons
Forms, inner	470 sq m
Forms, outer	475 sq m
Broken Stone	60 cu m

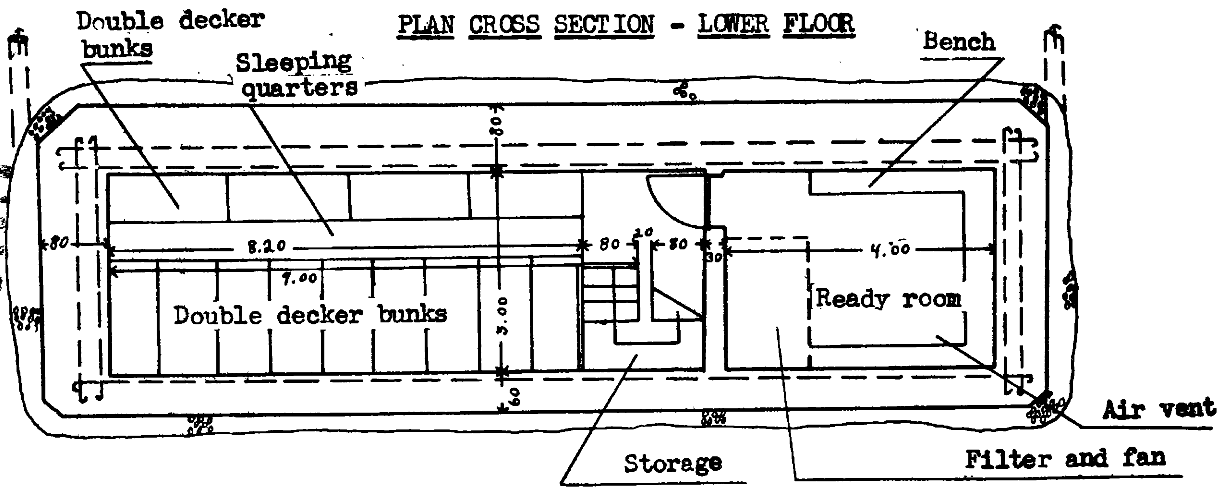
Accessories

Observation ports	3
Steel cover	1
Entrance doors, steel	4
Entrance doors, wooden	6
Metal ladders	2
Communications Room partitions	7
Communications Room desks	9
Communications Room chairs	10
Operations Room desks	8
Operations Room chairs	8
Drain covers	2
Gas curtains	2
Bunks	26
Benches	1
Rifle and tool rack	1
Intake	1
Exhaust	2
Speaking tube	1
Drainage unit	1
Board cover	1
Miscellaneous	

VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTALION (Continued)

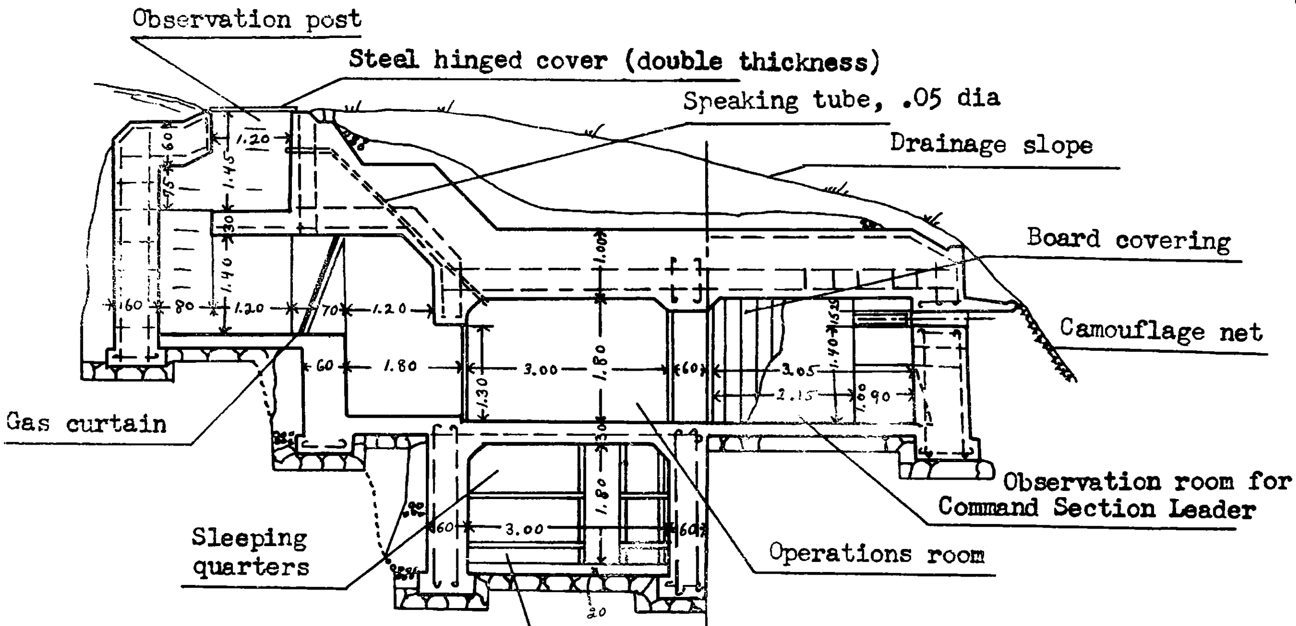
PLAN CROSS SECTION - LOWER FLOOR



VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTALION (Continued)

SECTION A-A

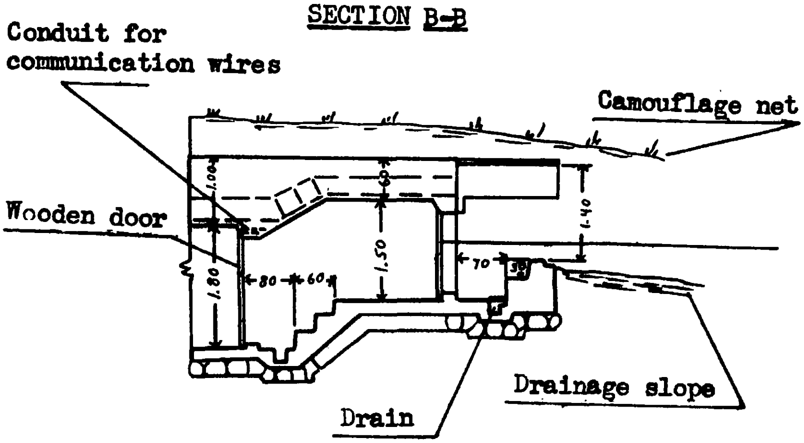


Reinforcing rods: 16mm dia., c-c .10
16mm dia., c-c .20

VII - OBSERVATION POSTS

ARTILLERY O.P. - BATTALION (Continued)

SECTION B-B



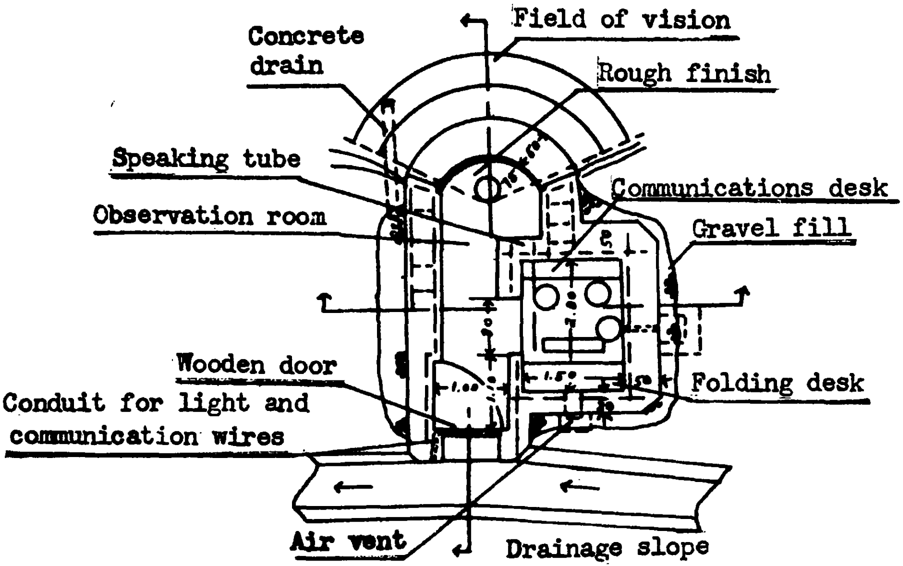
Notes:

1. Although the observation room in the diagram is contiguous to the main O.P., it may be entrenched independently in a forward position, or to the side; in such case, increase the area by about one square meter and provide desks, shelves and benches.
2. Provide a 120 field of vision; if a greater field is required, increase the number of observation rooms.
3. If the field of vision is limited, provide an independent (open) O.P. connecting with underground passageways.
4. The O.P. here shown is one employing a 1 meter heavy (field) range finder.
5. The radio room is equipped with a Type 94, Mark 3 radio.
6. The 6-meter observation glass is placed on a pedestal having adjustable legs.
7. Provide rifle and tool racks.
8. The entrance is disposed so as to accommodate sentries.

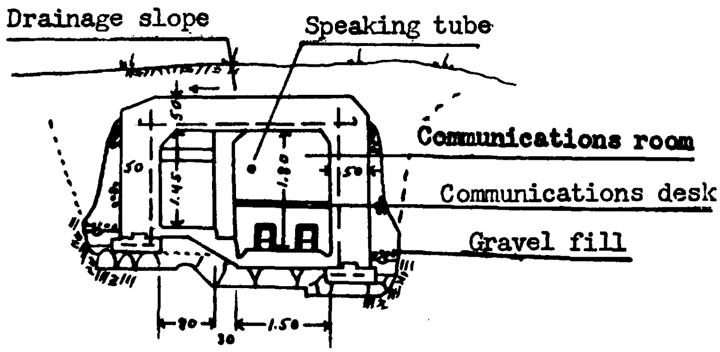
VII - OBSERVATION POSTS

ARTILLERY O.P. -AUXILIARY

PLAN CROSS SECTION



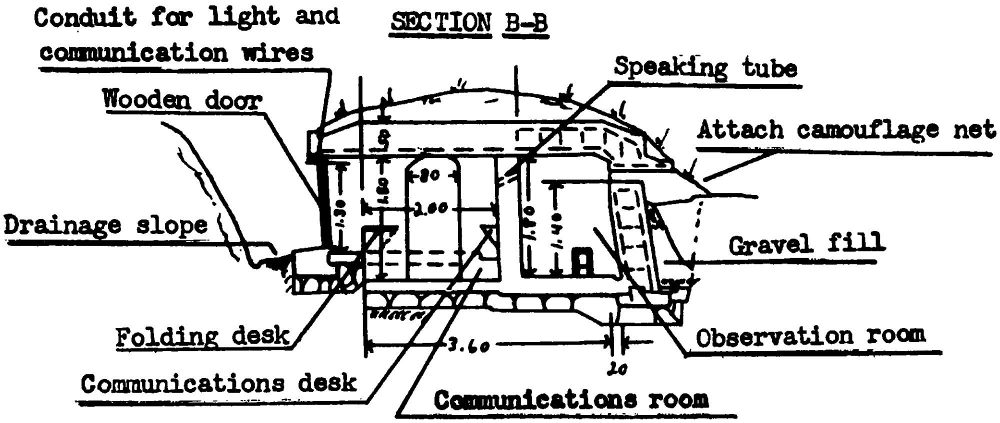
SECTION A-A



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

VII - OBSERVATION POSTS

ARTILLERY O.P. - AUXILIARY (Continued)



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

Notes:

1. The diagram shows an artillery OP in which one field clinometer and one pair of binoculars are used; observation ports are located where these instruments can best be used.
2. When observation room is not used for a 1 meter heavy (field) range finder, the observation port is converted to a fire port by providing concrete fill-in.

List of Required Materials

Concrete..................26 cu m
Steel reinforcement......0.8 ton
Forms { inner............50 sq m
Forms { outer............52 sq m
Broken stone............. 6 cu m

Accessories

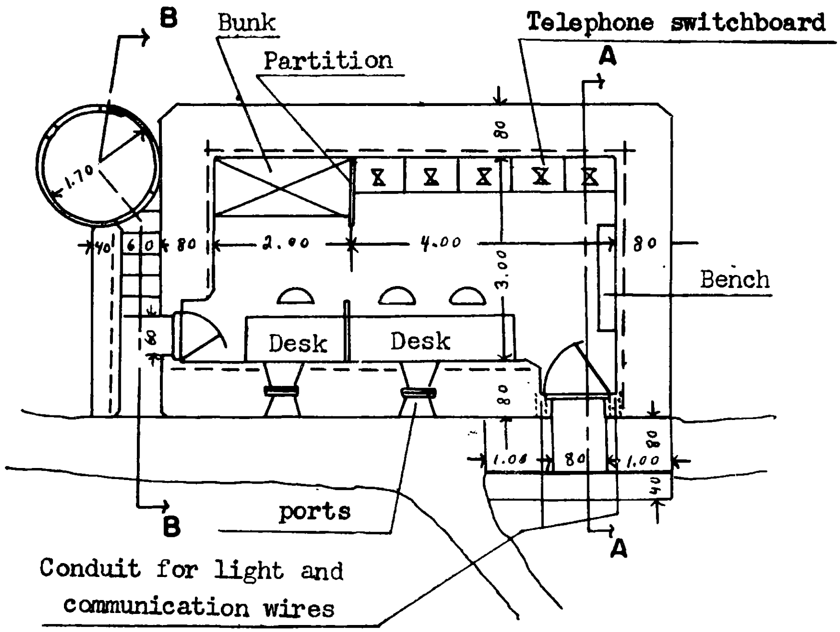
Observation port......1
Entrance door, wooden .1
Folding desk 1
Bench.................1
Chairs 3
Communications desk...1
Intake................1
Exhaust 1
Speaking tube.........1
Drainage unit.........1
Miscellaneous.........

VIII - COMMAND POSTS

GARRISON UNIT COMMANDER C.P.

(Amount of concrete: 81 cu m)

PLAN CROSS SECTION

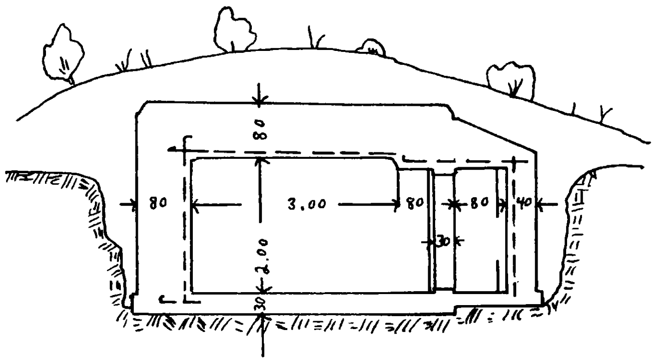


Reinforcing rods: 16mm dia., c-c .20

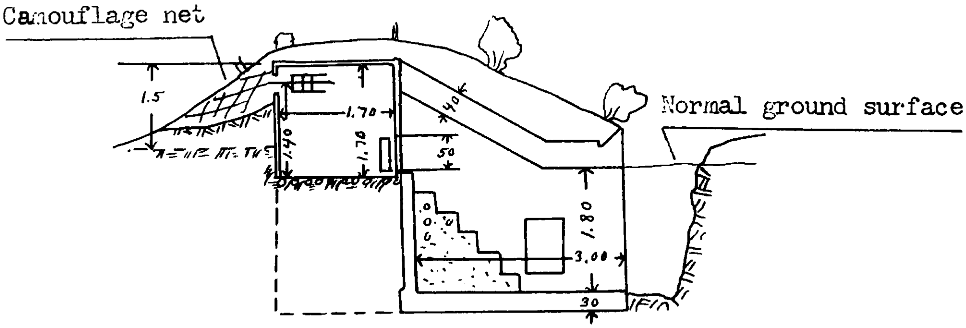
VIII - COMMAND POSTS

GARRISON UNIT COMMANDER C.P. (Continued)

SECTION A-A



SECTION B-B



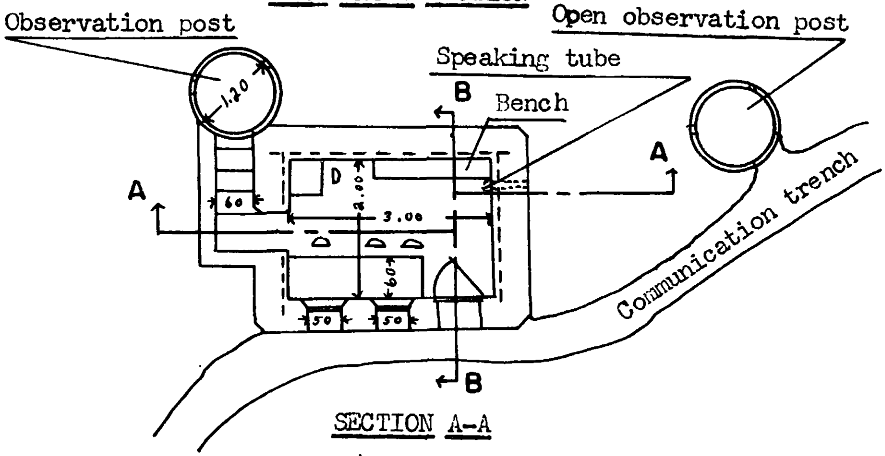
Reinforcing rods: 16mm dia., c-c .20

VIII - COMMAND POSTS

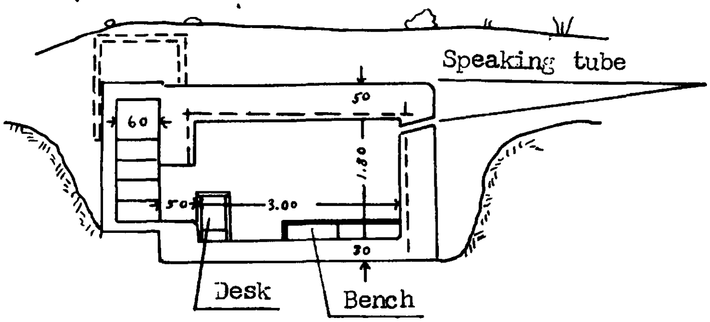
PLATOON C.P.

(Amount of concrete: about 25 cu m)

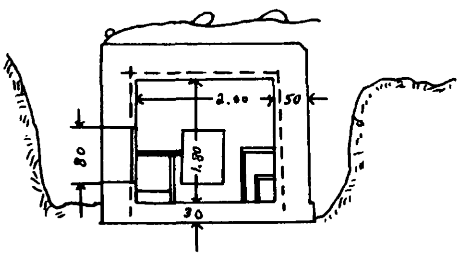
PLAN CROSS SECTION



SECTION A-A



SECTION B-B



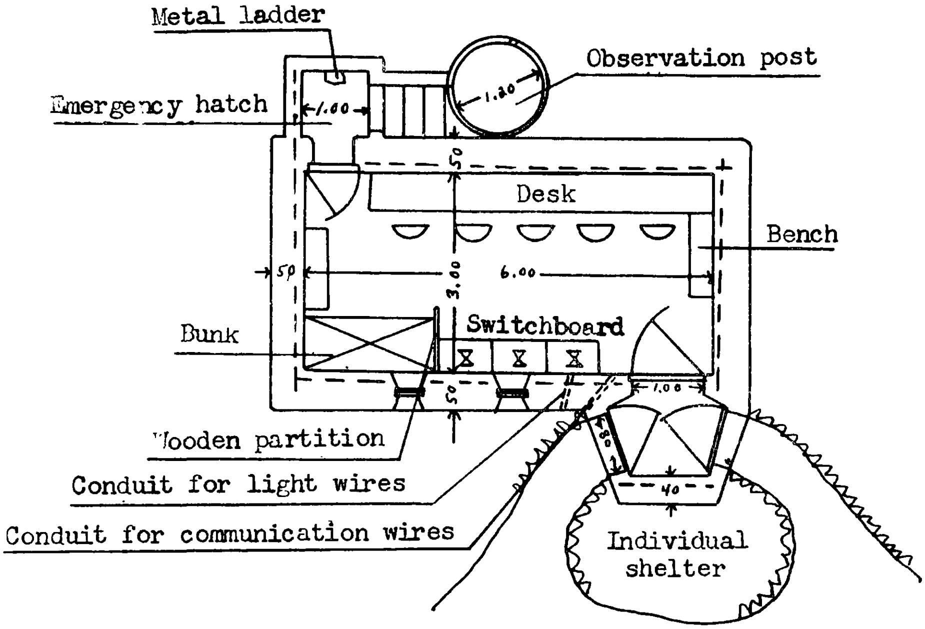
Note: Height of the Observation Post is determined by local terrain.

Reinforcing rods: 16mm dia., c.c. 20

VIII - COMMAND POSTS

COMPANY C.P. /TYPE I/
(Amount of concrete: about 53 cu m)

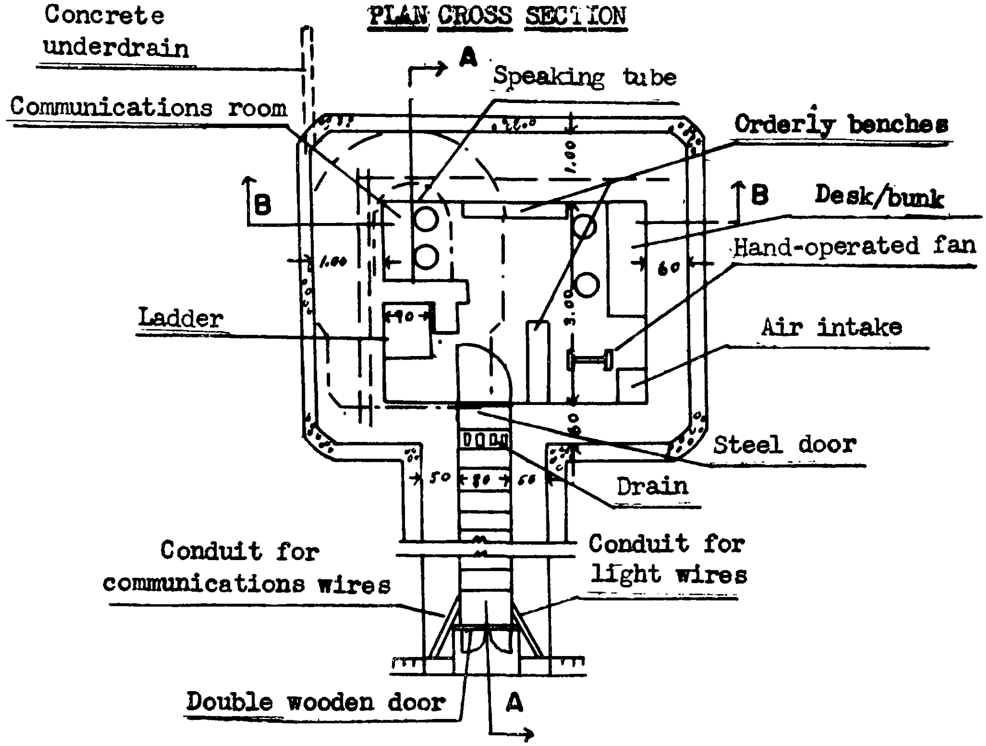
PLAN CROSS SECTION



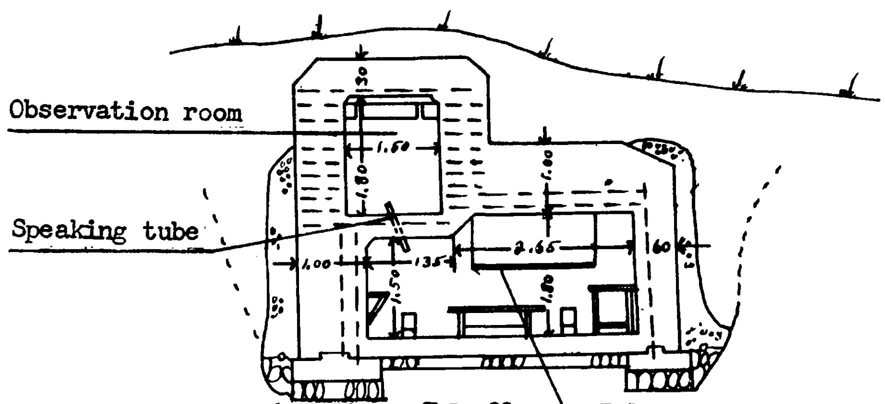
VIII - COMMAND POSTS

COMPANY C.P. /TYPE II/

PLAN CROSS SECTION



SECTION B-B



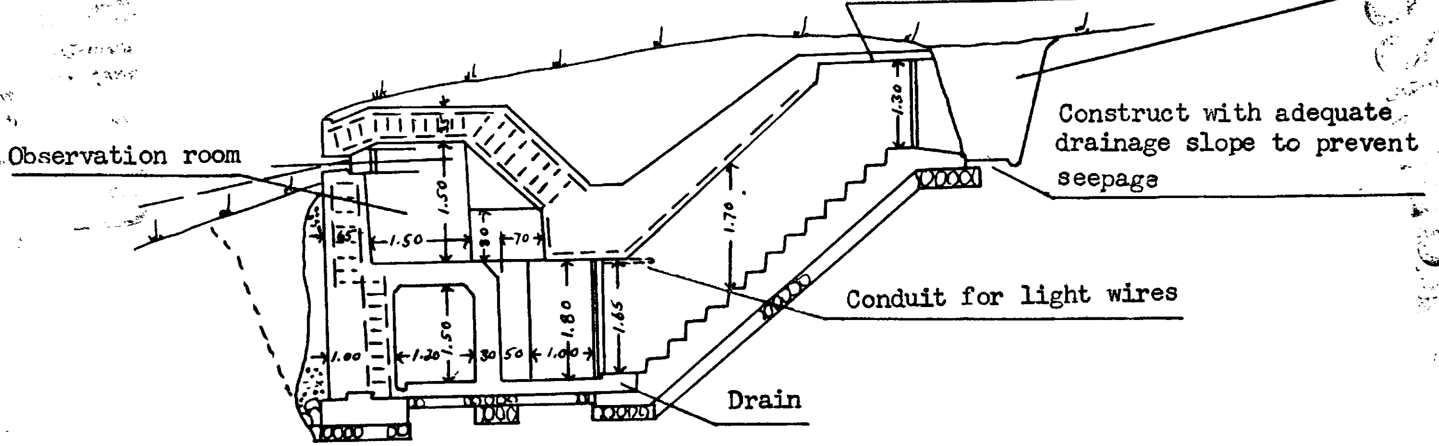
Reinforcing rods: 16mm dia., c-c 20 cm
16mm dia., c-c 40

1. The field of visions of the observation room is about 180°.
2. Exterior of wooden entrance door reinforced with galvanized iron.
3. Disposition of foundation, drainage, and entrances should take into account factors of local terrain and soil.

VIII - COMMAND POSTS

COMPANY C.P. /TYPE II/ (Continued)

SECTION A-A



Reinforcing rods: 16mm dia., c-c .10

List of Required Materials

Concrete............76 cu m
Steel reinforcement. 4 ton
Forms {inner.......90 sq m
Forms {outer.......155 sq m
Broken stone........15 cu m

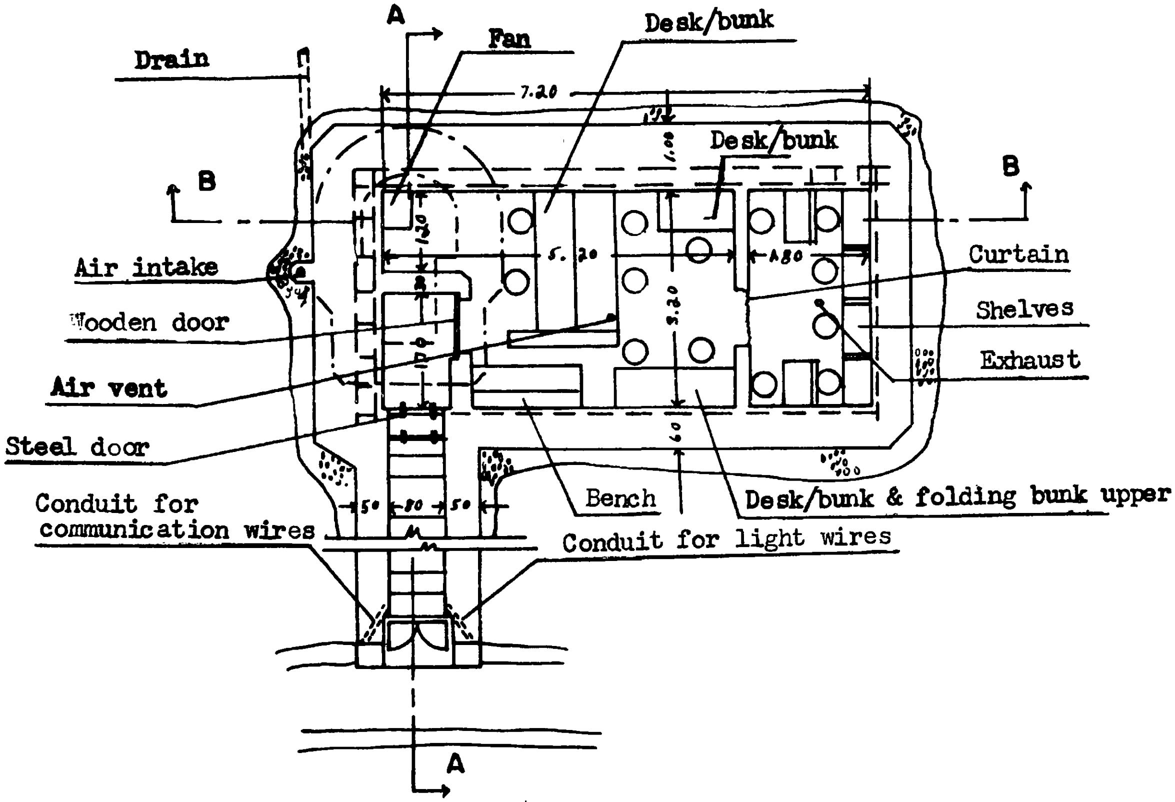
Accessories

Observation ports........1
Entrance doors, steel....1
Entrance doors, wooden...1
Benches..................2
Metal ladder.............1
Combination bunk & desk..1
Chairs...................2
Communications room desk...1
Communications room chairs.2
Folding bunks..............1
Intake.....................1
Exhaust....................1
Cover......................1
Speaking tube..............1
Drainage unit..............1
Miscellaneous..............

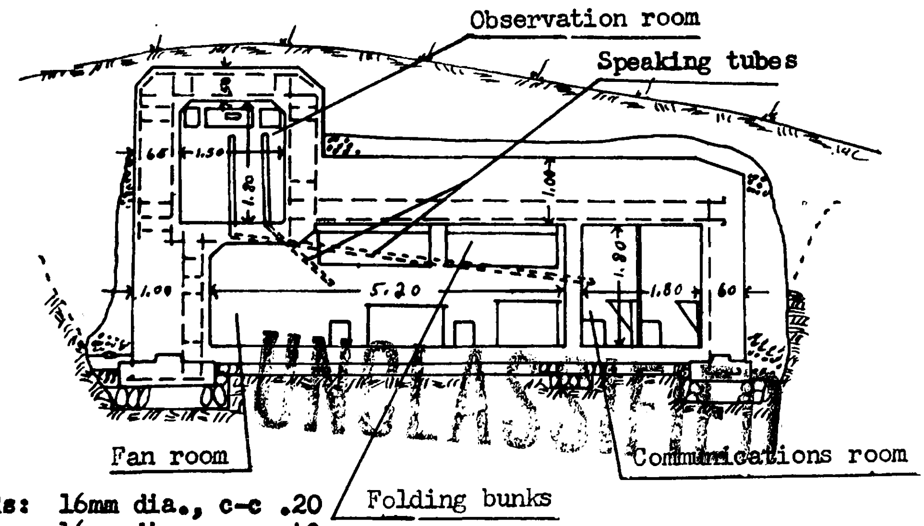
VIII - COMMAND POSTS

BATTALION C.P.

PLAN CROSS SECTION



SECTION B-B

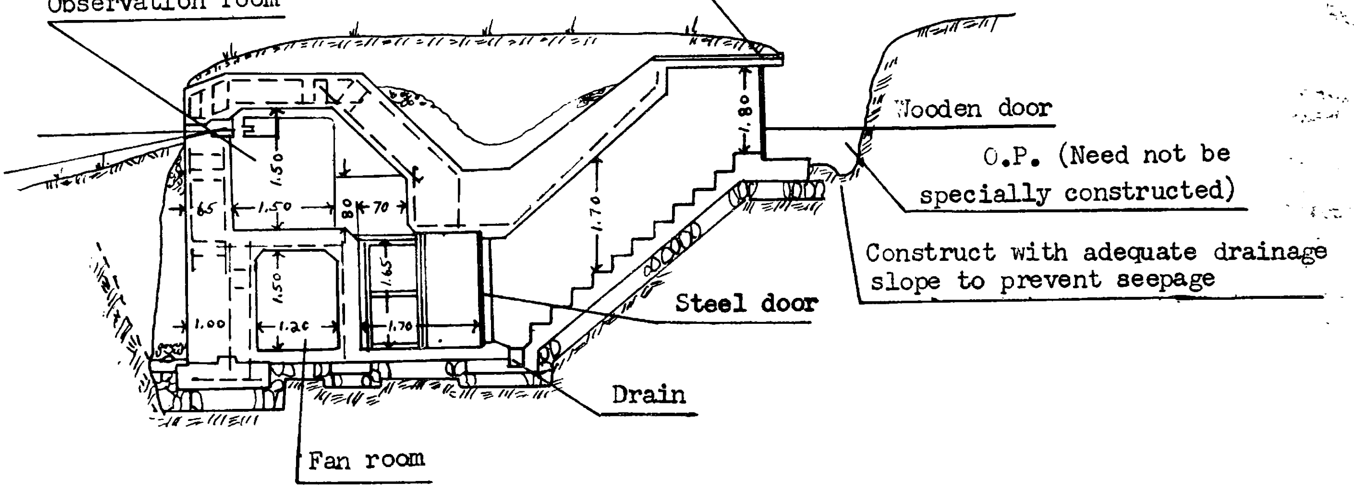


Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

VIII - COMMAND POSTS

BATTALION C.P. (Continued)

SECTION A-A



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

VIII COMMAND POSTS

BATTALION C.P. (Continued)

Notes:

1. Detail of Observation Room is on a separate diagram.

2. Exterior of wooden entrance doors reinforced with galvanized iron.

List of Required Materials

Concrete..............135 cu m
Steel Reinforcement...5 tons
Forms { inner.........95 sq m; outer.........170 sq m }
Broken Stone..........20 cu m

Accessories

Observation port......................1
Entrance doors, wooden 2
Entrance door, steel..................1
Curtains for entrance.................1
Metal ladder..........................1
Folding bunks.........................4 men
Combination bunk and desk.............3
Communications Room partitions........5
Communications Room desks.............6
Communications Room chairs............6
Ladders...............................7
Benches...............................2
Intake................................1
Exhausts..............................2
Drain cover...........................1
Speaking tube.........................1
Drainage unit.........................1
Miscellaneous.........................

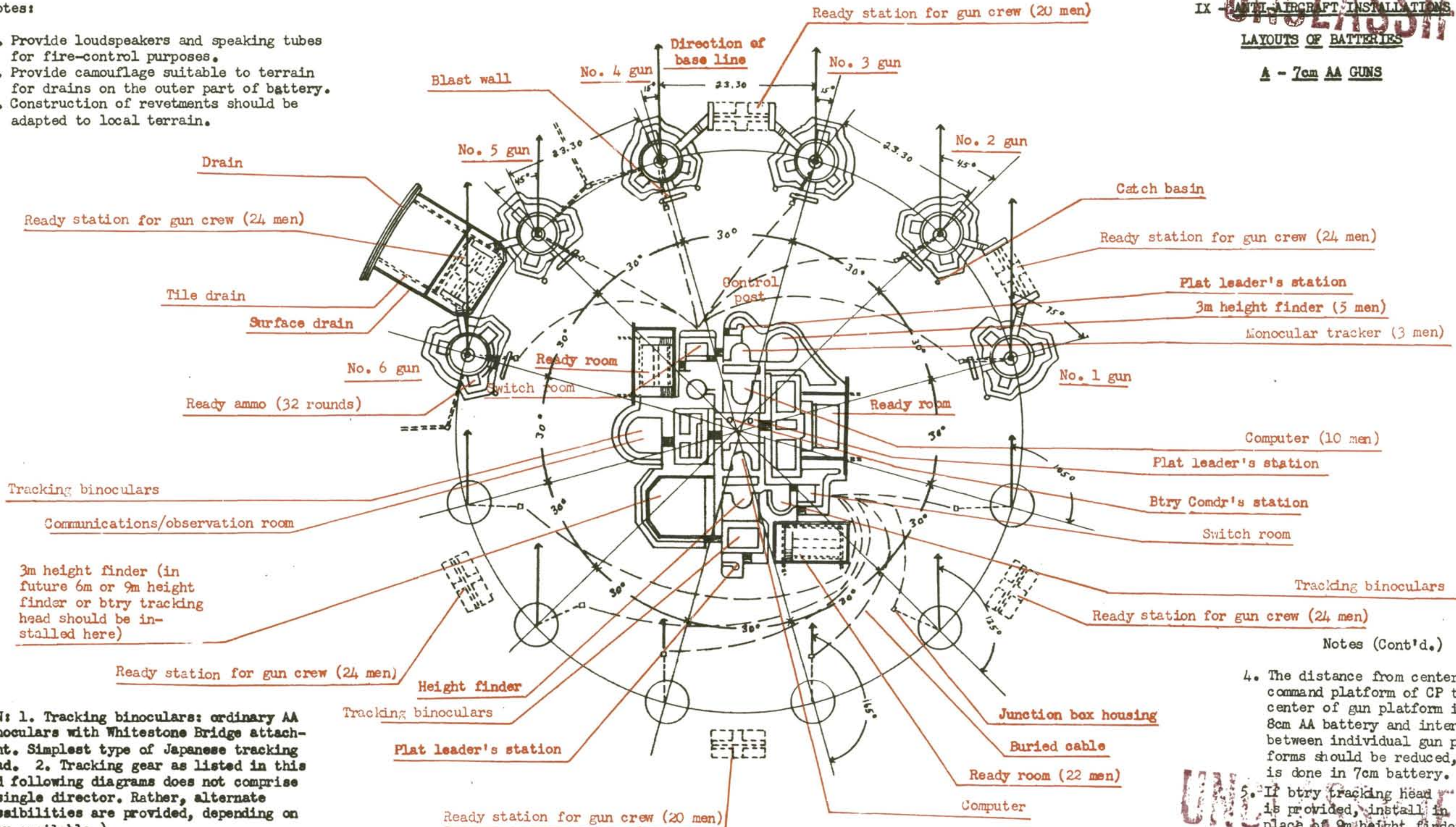
IX - ANTI-AIRCRAFT INSTALLATIONS

LAYOUTS OF BATTERIES

A - 7cm AA GUNS

Notes:

1. Provide loudspeakers and speaking tubes for fire-control purposes.
2. Provide camouflage suitable to terrain for drains on the outer part of battery.
3. Construction of revetments should be adapted to local terrain.



Notes (Cont'd.)

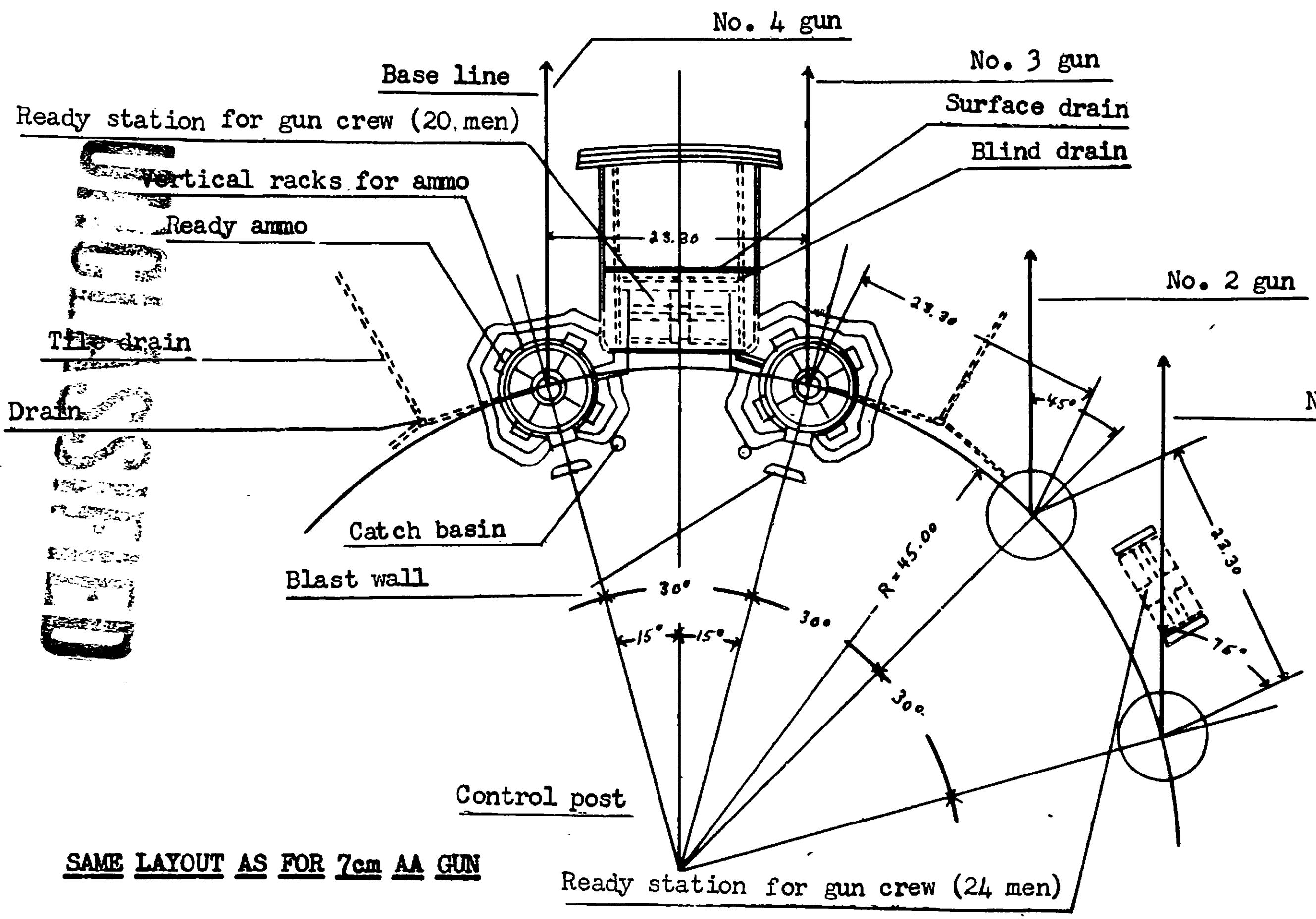
4. The distance from center of command platform of CP to center of gun platform in an 8cm AA battery and interval between individual gun platforms should be reduced, as is done in 7cm battery.
5. If btry tracking head is provided, install in place of 9m height finder.

(TN: 1. Tracking binoculars: ordinary AA binoculars with Whitestone Bridge attachment. Simplest type of Japanese tracking head. 2. Tracking gear as listed in this and following diagrams does not comprise a single director. Rather, alternate possibilities are provided, depending on gear available.)

IX - ANTI-AIRCRAFT INSTALLATIONS

LAYOUTS OF BATTERIES (Continued)

B - 8cm AA GUNS



SAME LAYOUT AS FOR 7cm AA GUN

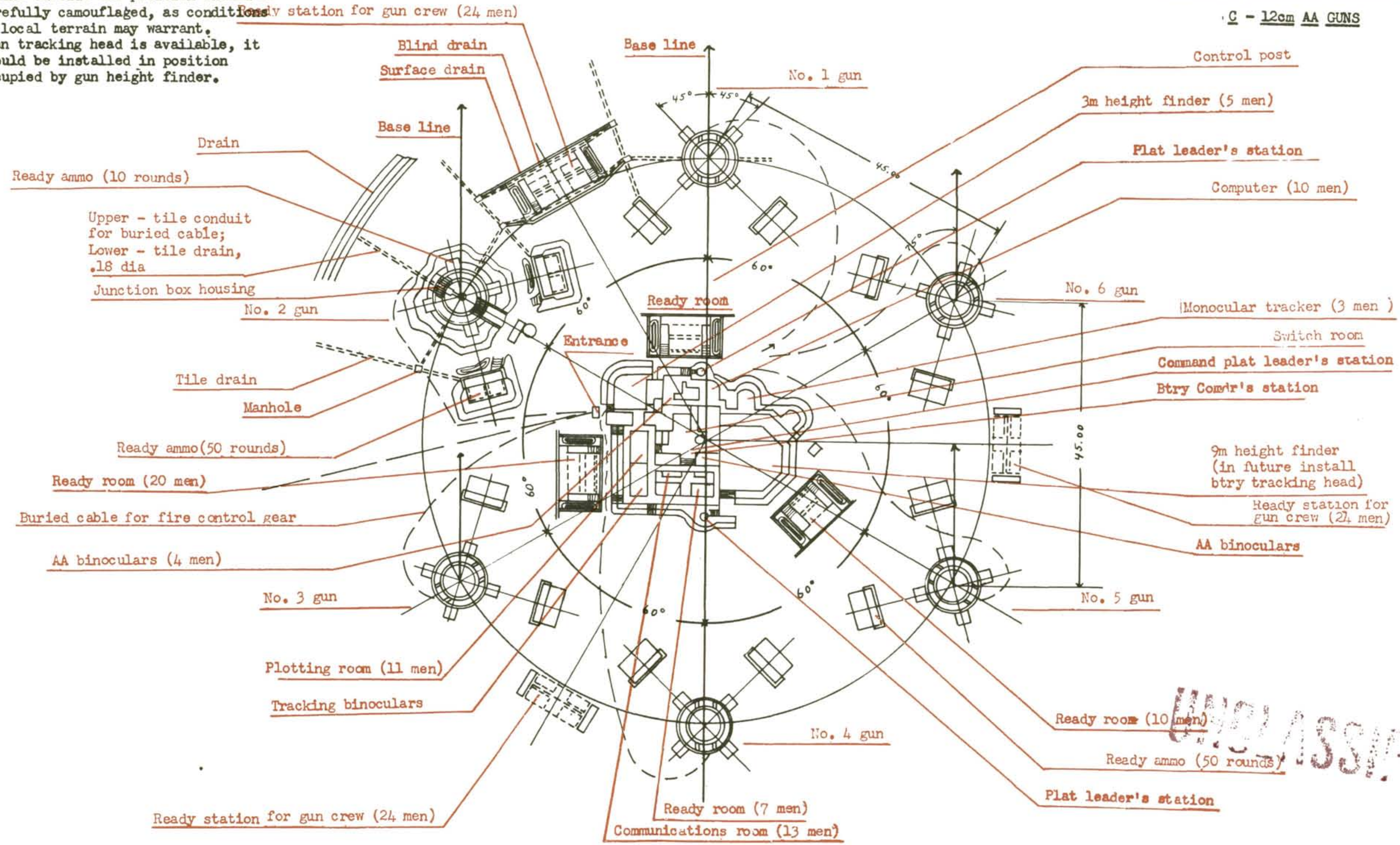
IX. ANTI-AIRCRAFT INSTALLATIONS

LAYOUTS OF BATTERIES (Continued)

C - 12cm AA GUNS

Notes:

1. Drains outside the position should be carefully camouflaged, as conditions of local terrain may warrant.
2. When tracking head is available, it should be installed in position occupied by gun height finder.



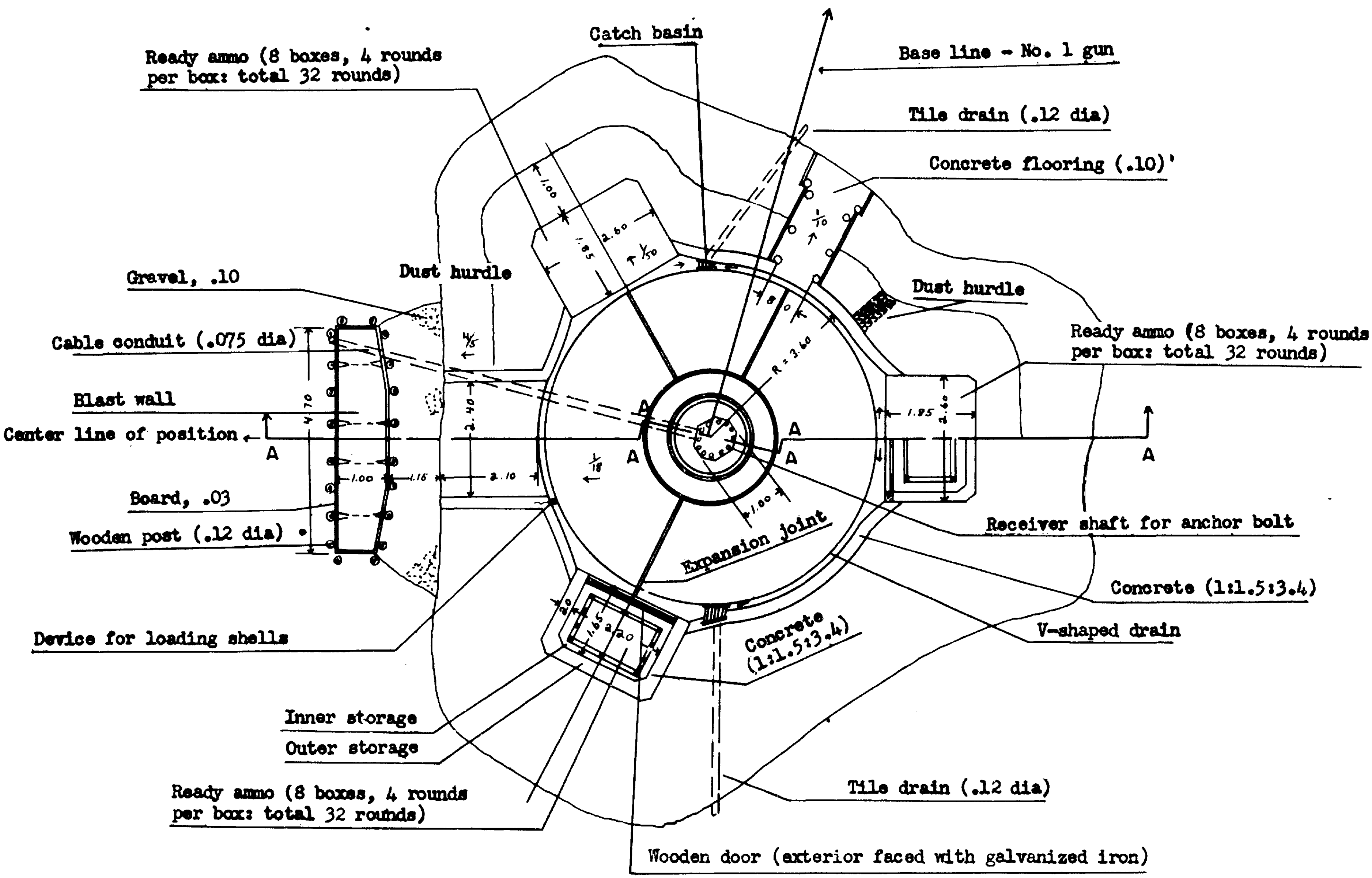
IX - ANTI- AIRCRAFT INSTALLATIONS

EMPLACEMENTS

A - 7cm AA GUN

LAYOUT

PLAN CROSS SECTION



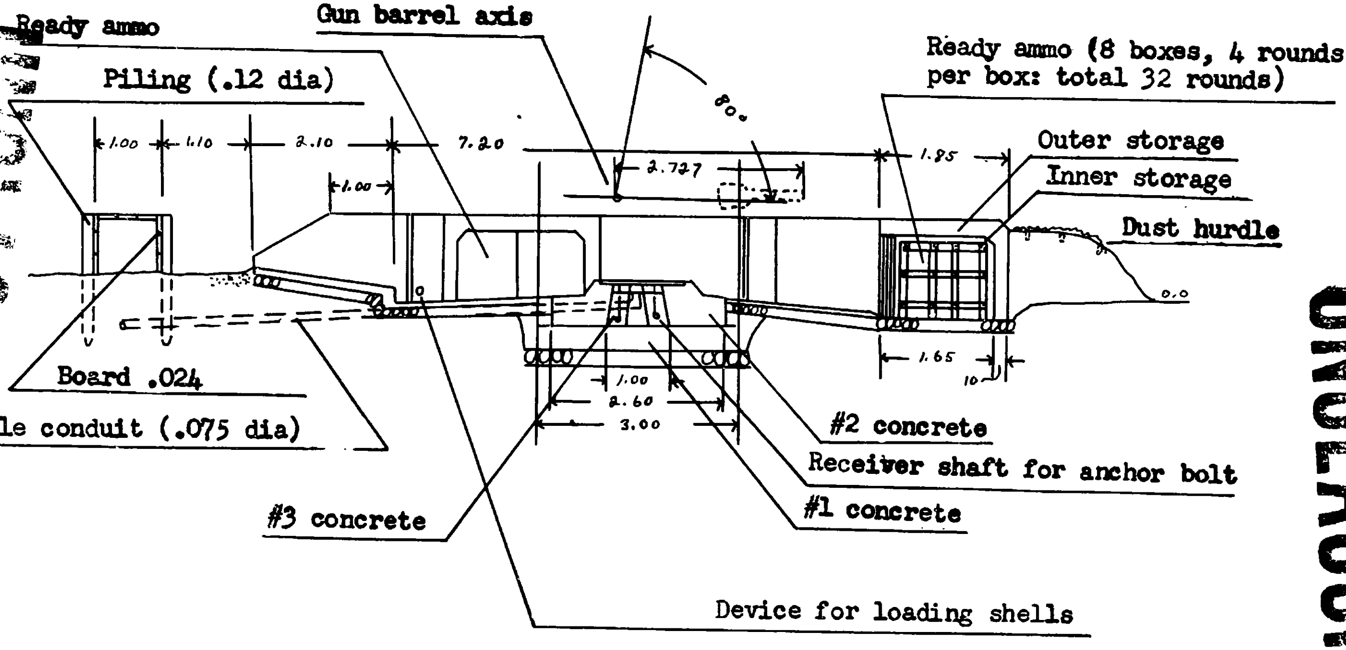
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

A - 7cm AA GUN (Continued)

LAYOUT (Continued)

SECTION A-A



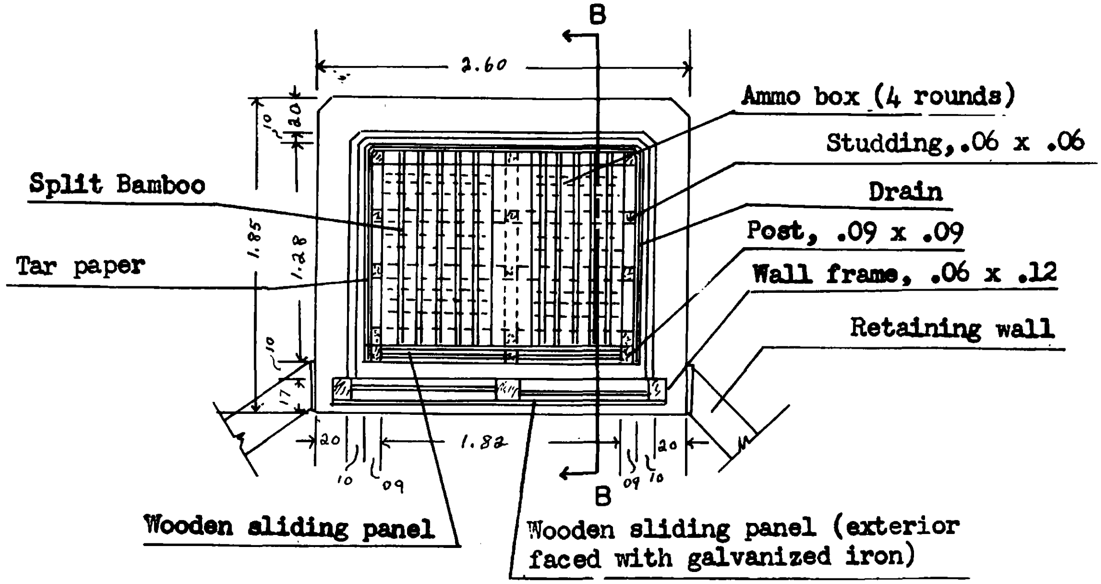
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

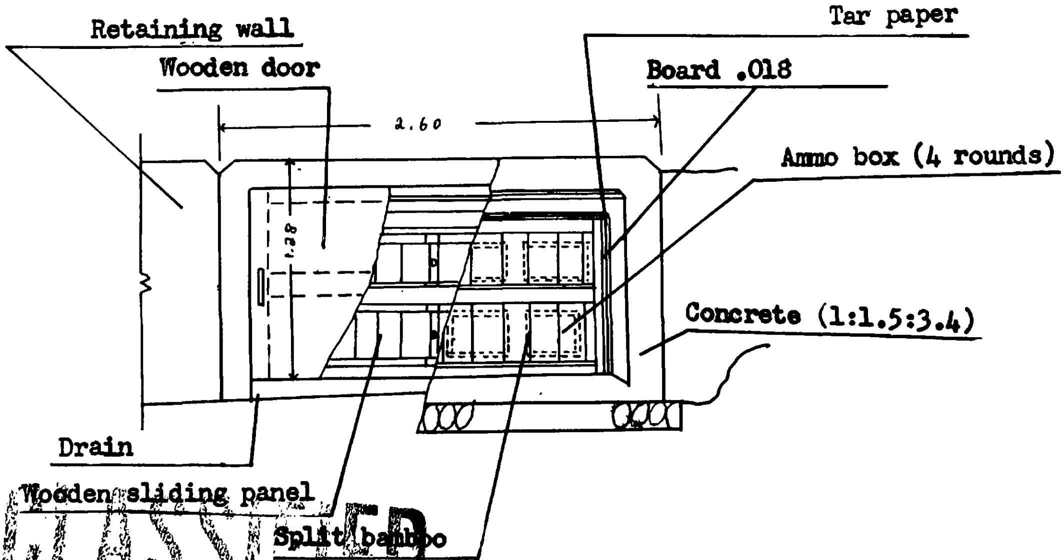
A - 7cm AA GUN (Continued)

DETAILS OF READY MAGAZINE

PLAN CROSS SECTION



FRONT VIEW



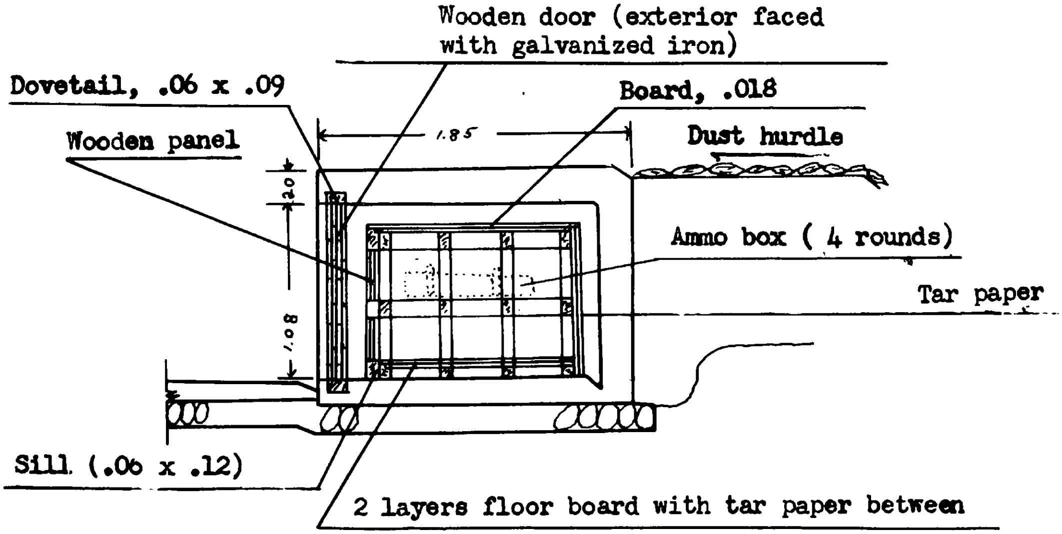
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

A - 7cm AA GUN (Continued)

DETAILS OF READY MAGAZINE (Continued)

SECTION B-B



Notes:

1. #3 concrete layer is set after the anchor bolts and platform have been installed.

2. If necessary, retaining wall may be made of wood.

IX - ANTI-AIRCRAFT INSTALLATIONS

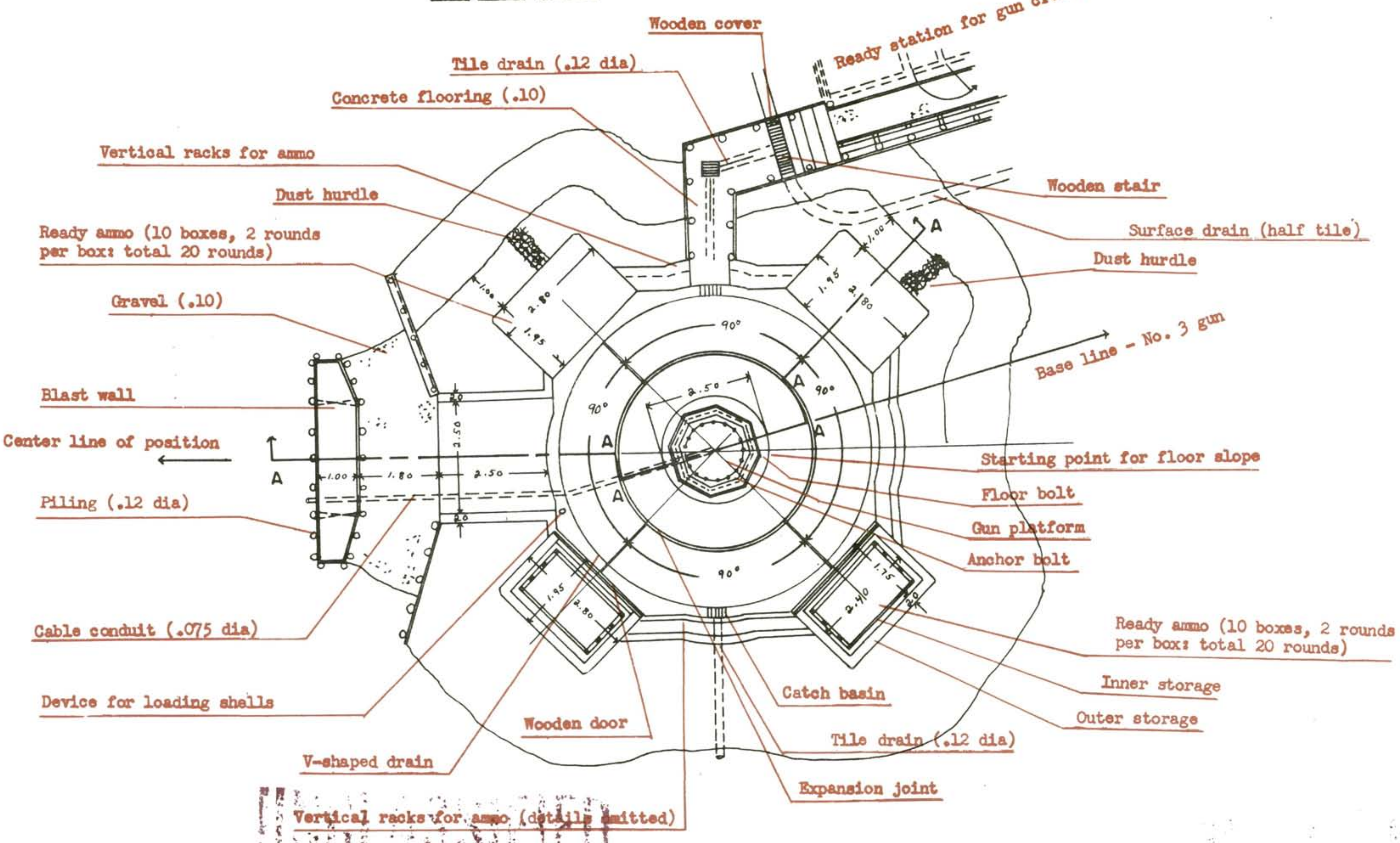
EMPLACEMENTS (Continued)

B - 8cm AA GUN

LAYOUT

1/100

PLAN CROSS SECTION



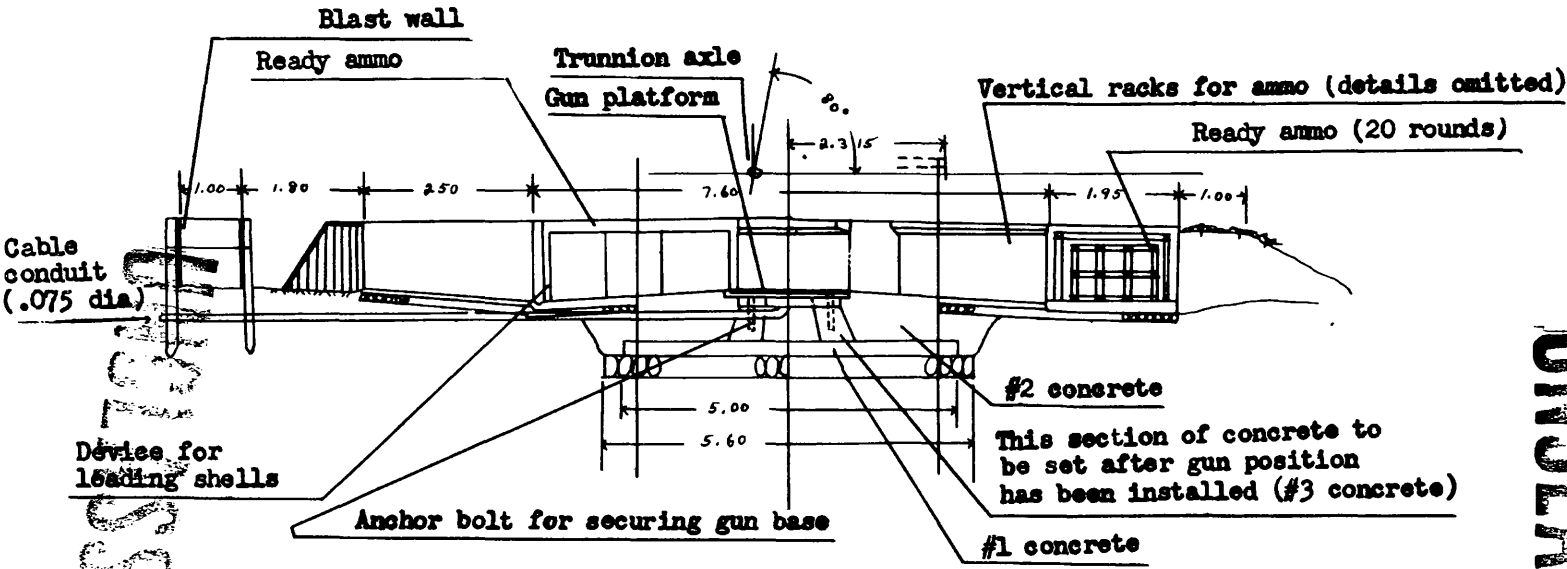
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

B - 8cm AA GUN (Continued)

LAYOUT (Continued)

SECTION A-A



1. Lay #3 concrete after putting in the gun anchor bolts and laying the platform.
2. If conditions warrant, build wooden retaining wall.

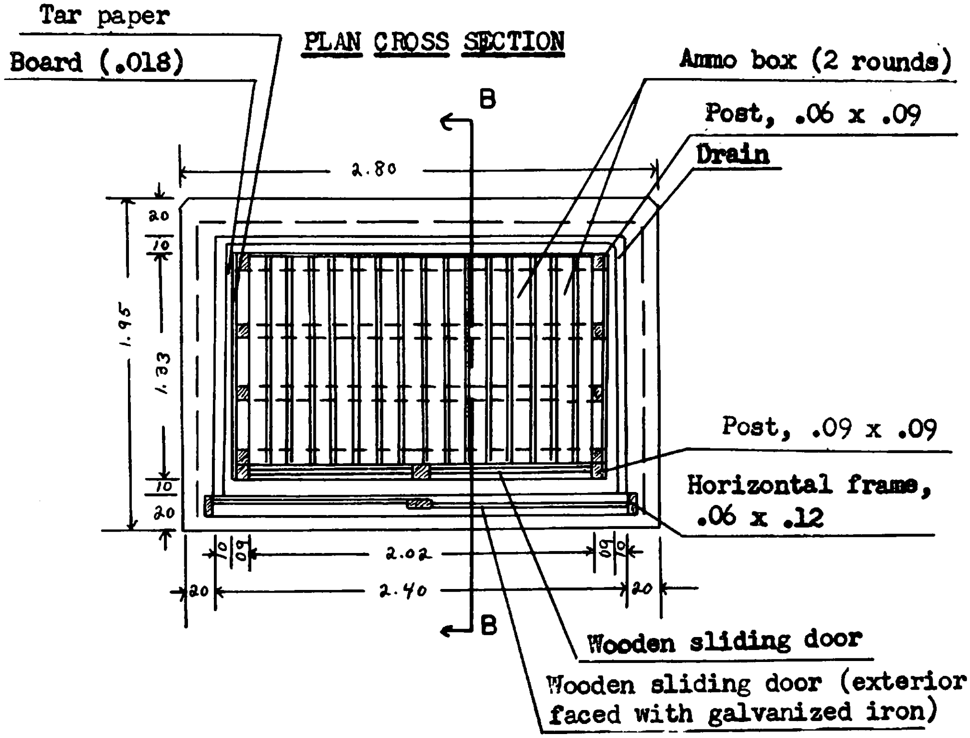
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

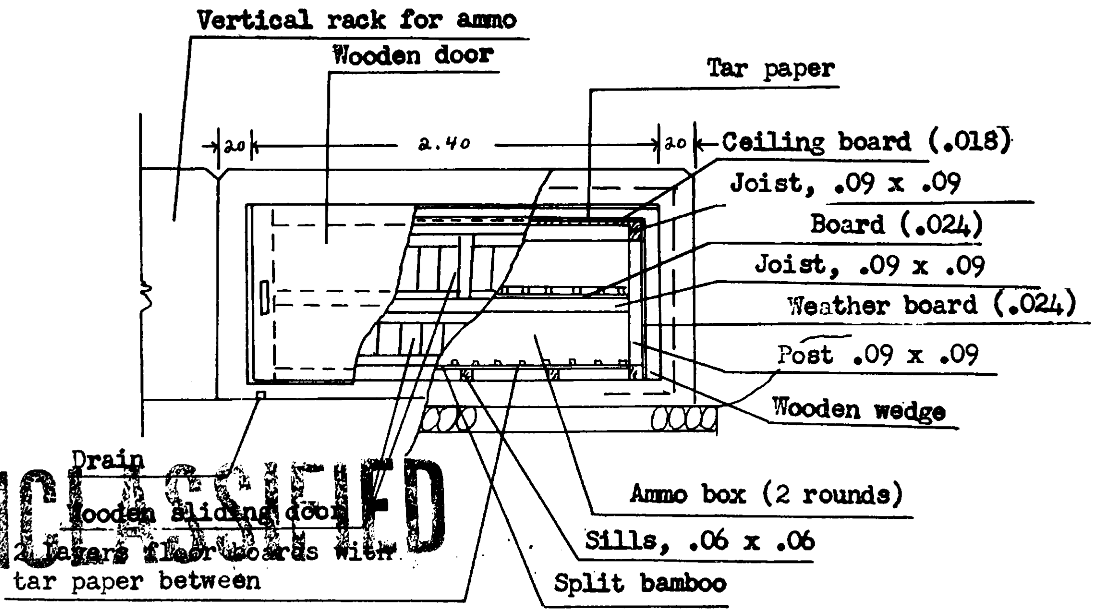
mm AA GUN (Continued)

DETAILS OF READY MAGAZINE

PLAN CROSS SECTION



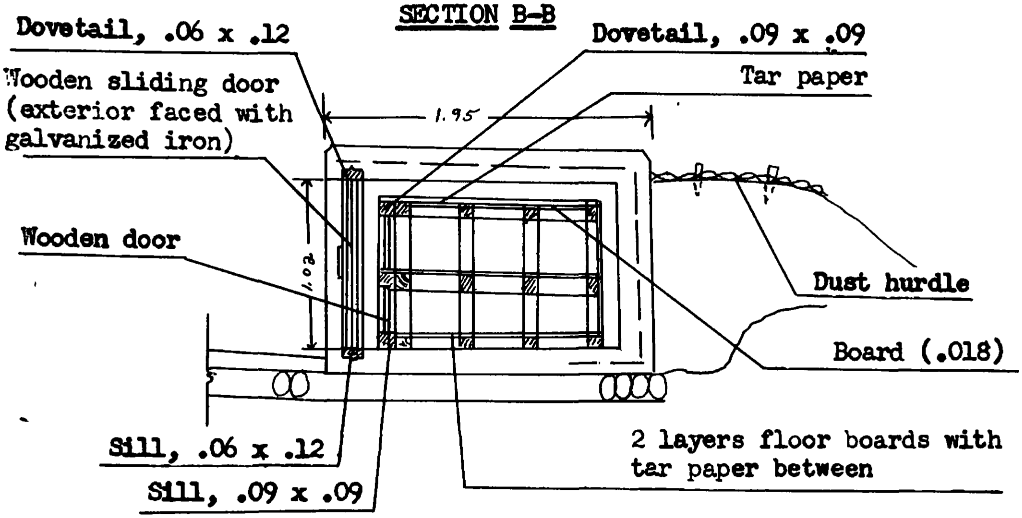
FRONT VIEW



IX - ANTI-AIRCRAFT INSTALLATIONS
EMPLACEMENTS (Continued)
B - 8cm AA GUN (Continued)

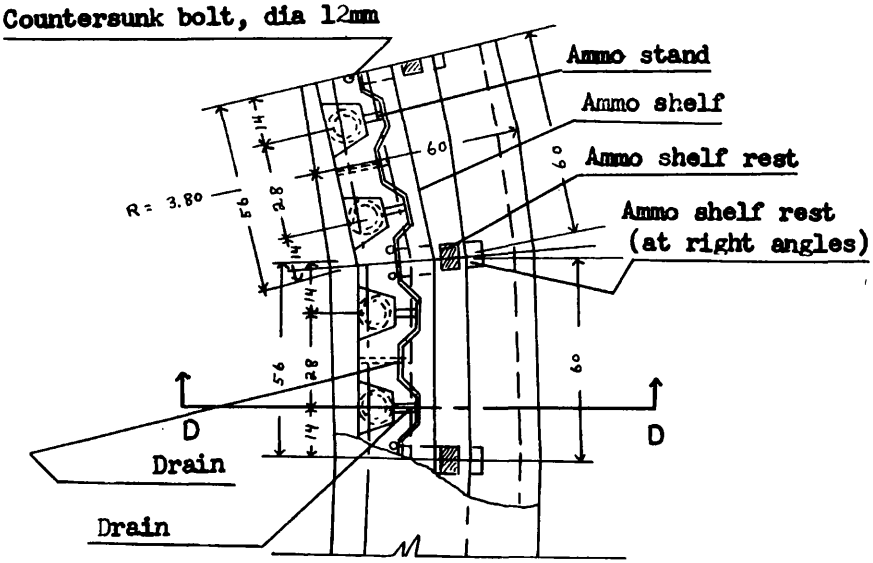
DETAILS OF READY MAGAZINE (Continued)

SECTION B-B



DETAIL OF VERTICAL RACK FOR AMMO

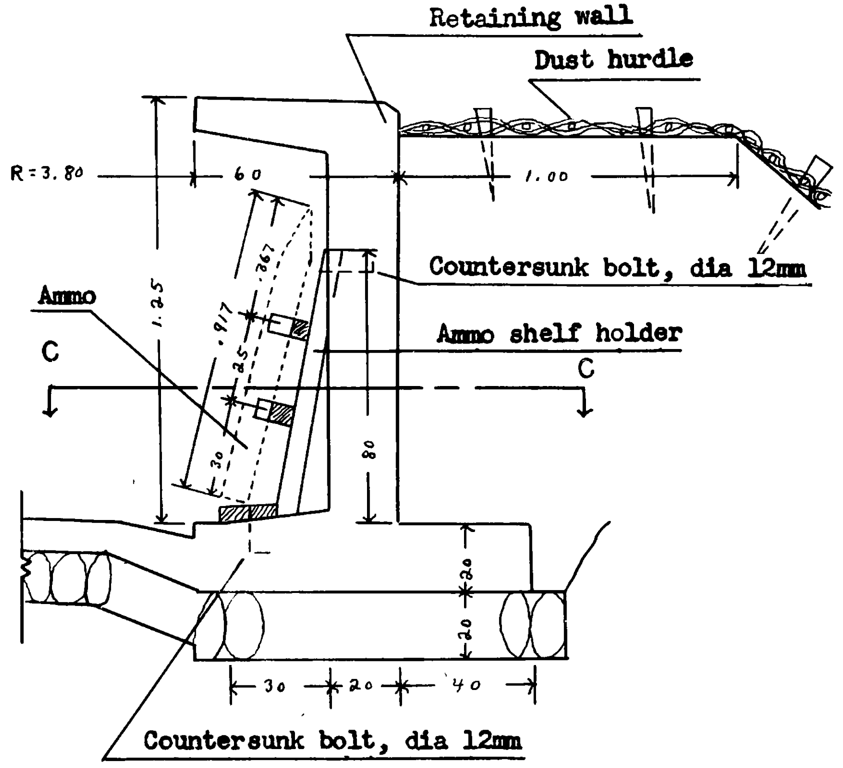
SECTION C-C



IX - ANTI-AIRCRAFT INSTALLATIONS
EMPLACEMENTS (Continued)
B - 8cm AA GUN (Continued)

DETAIL OF VERTICAL RACK FOR AMMO (Continued)

SECTION D-D

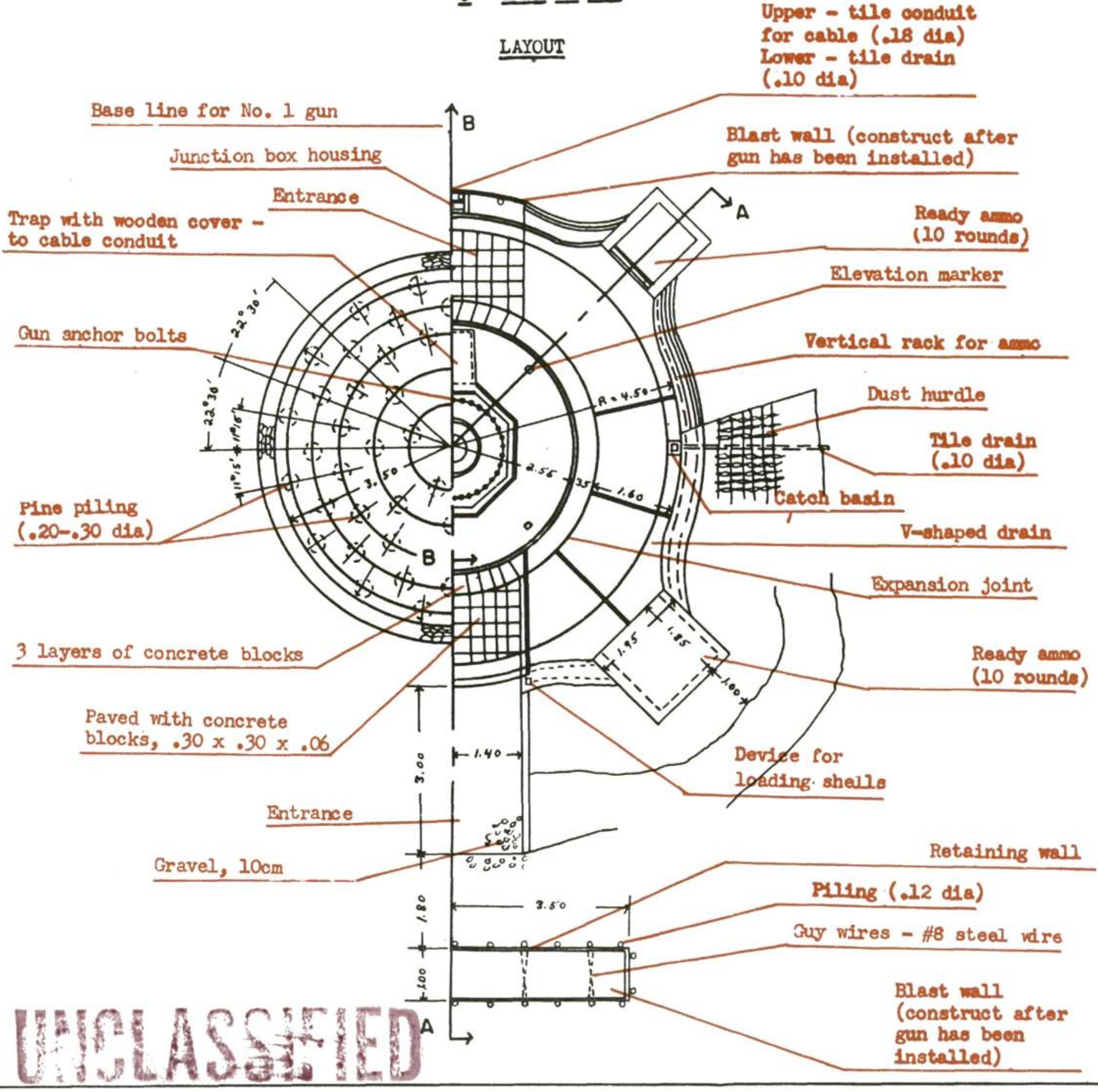


IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN

LAYOUT



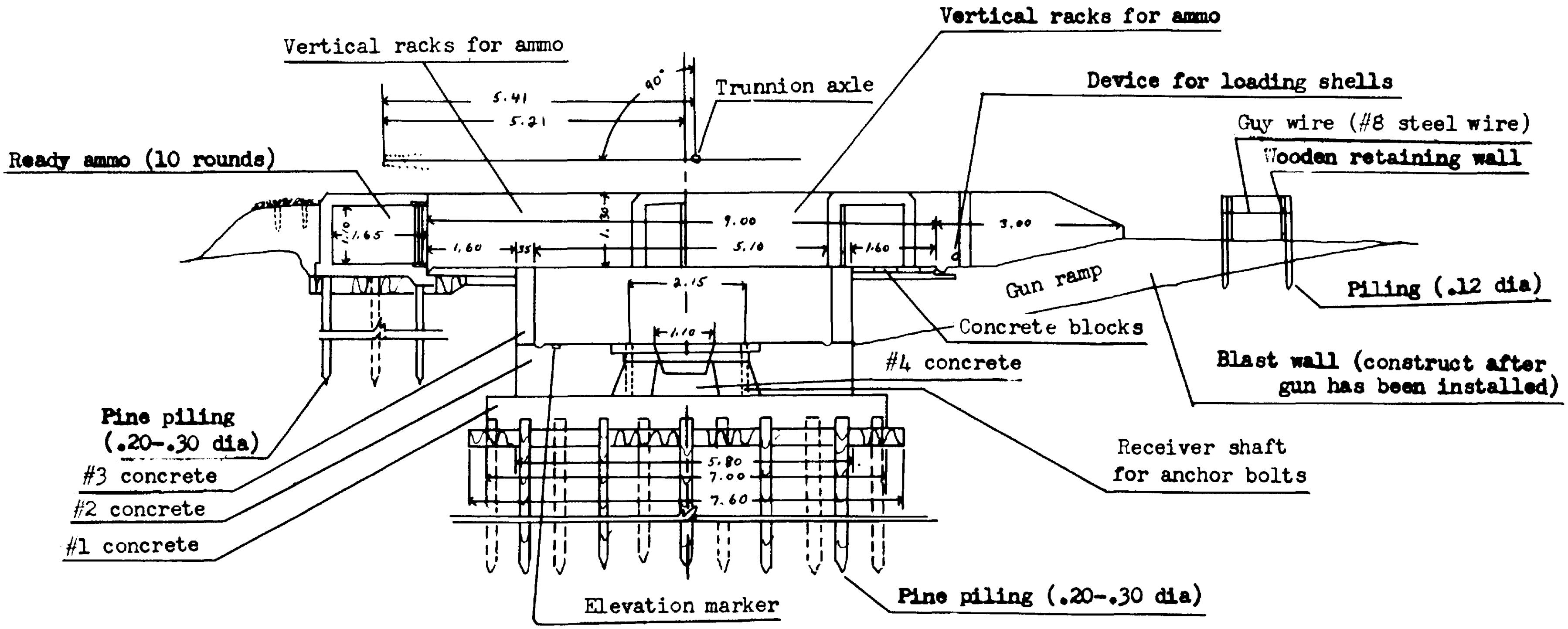
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

LAYOUT (Continued)

SECTION A-A



1. This diagram shows the detail of #1 and #5 gun emplacements, as in attached diagrams; construct the other gun platforms in same manner.
2. After installing the gun, pile up concrete blocks in the section of #3 concrete which corresponds to the entrance-way; throw up an earth embankment outside of this; then lay concrete blocks as a pavement.
3. Lay #4 concrete after installing gun anchor bolts and platform.
4. If necessary the earth-retaining wall may be made of wood.
5. The foundation should be adapted to conditions of local soil. (This diagram shows a case in which the ground is soft.)

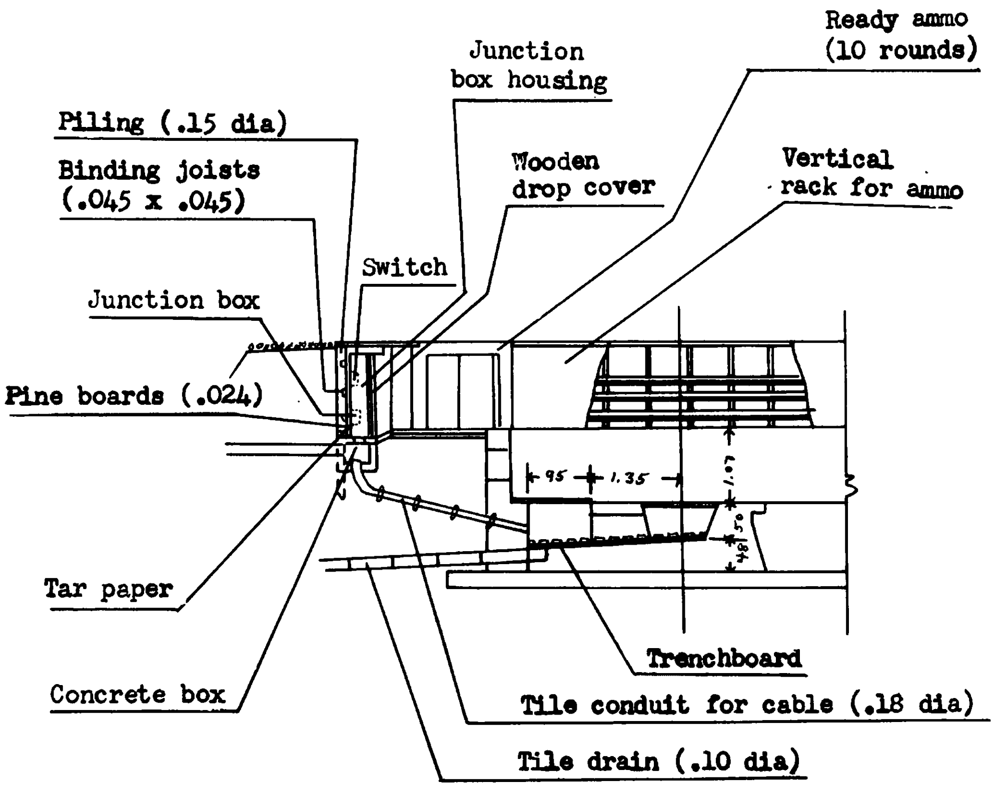
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

LAYOUT (Continued)

SECTION B-B

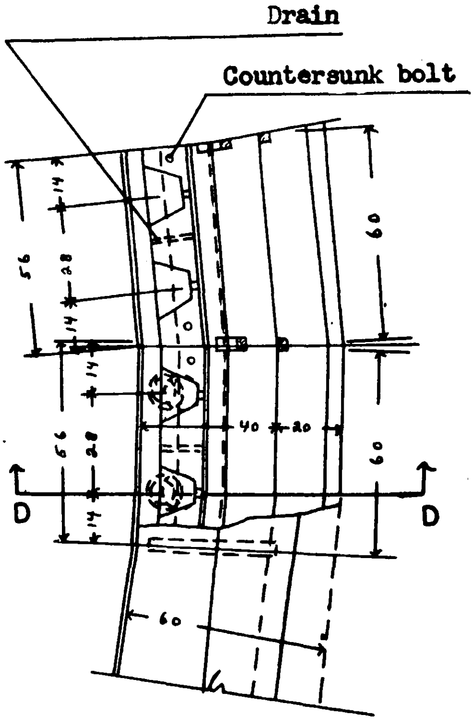


IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

DETAILS OF VERTICAL RACK FOR AMMO



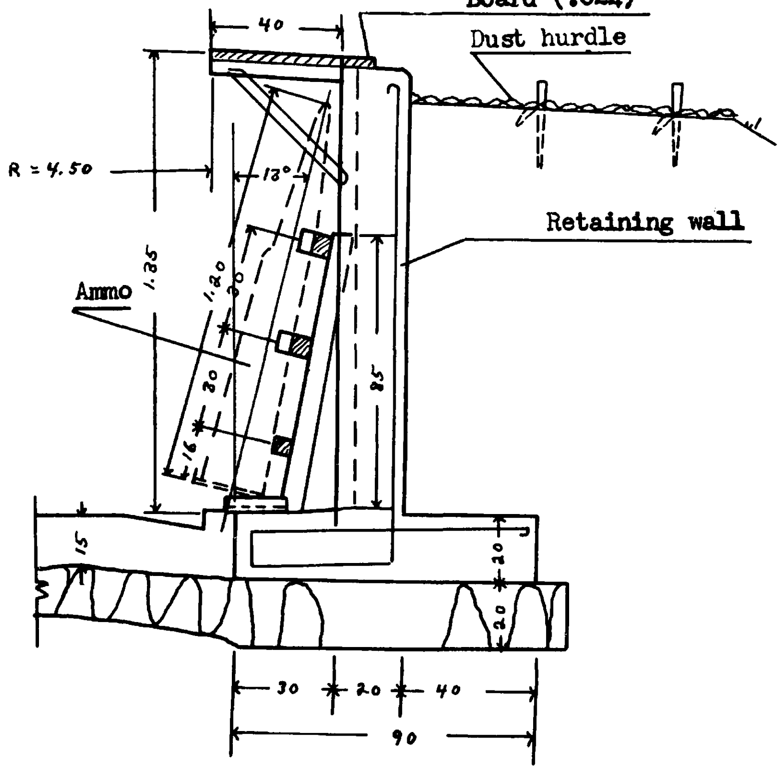
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

DETAILS OF VERTICAL RACK FOR AMMO (Continued)

SECTION D-D



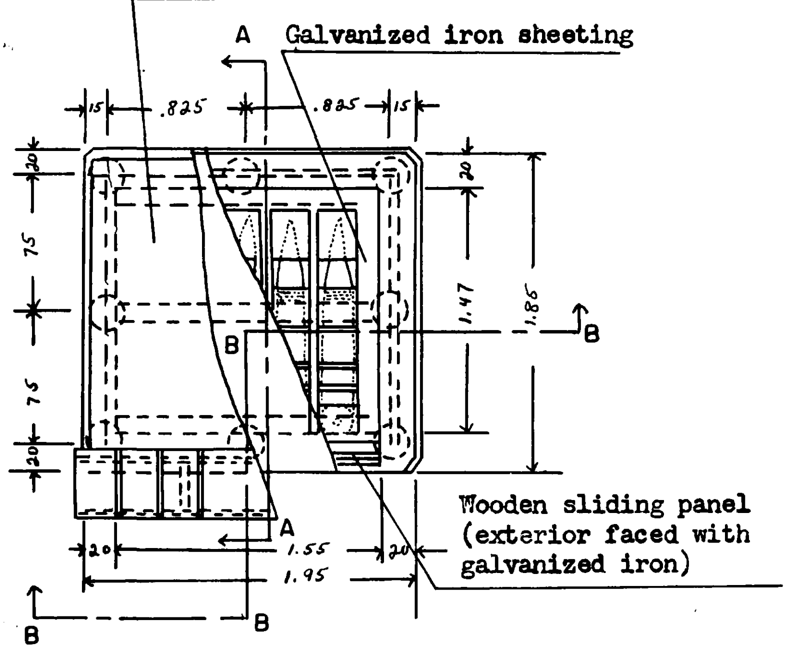
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

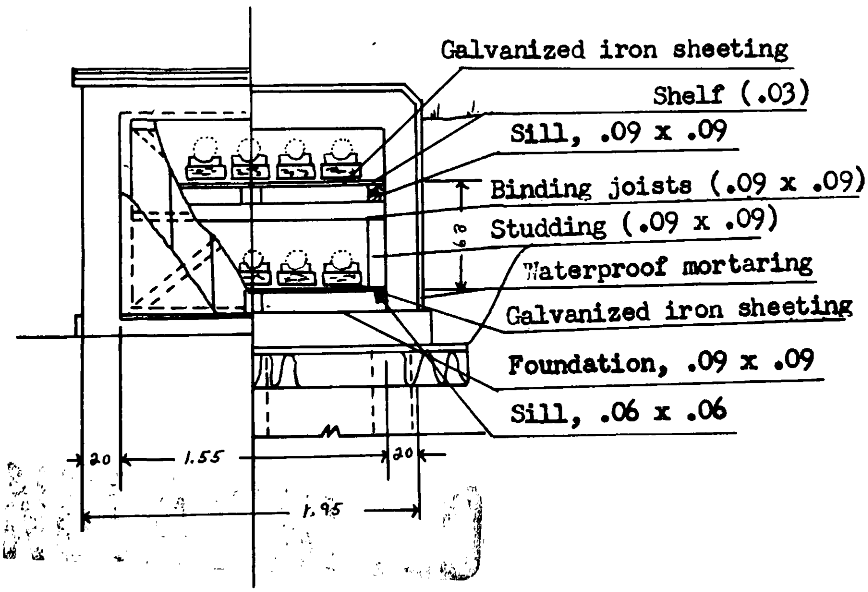
C - 12cm AA GUN (Continued)

DETAILS OF READY MAGAZINE

PLAN CROSS SECTION



SECTION B-B



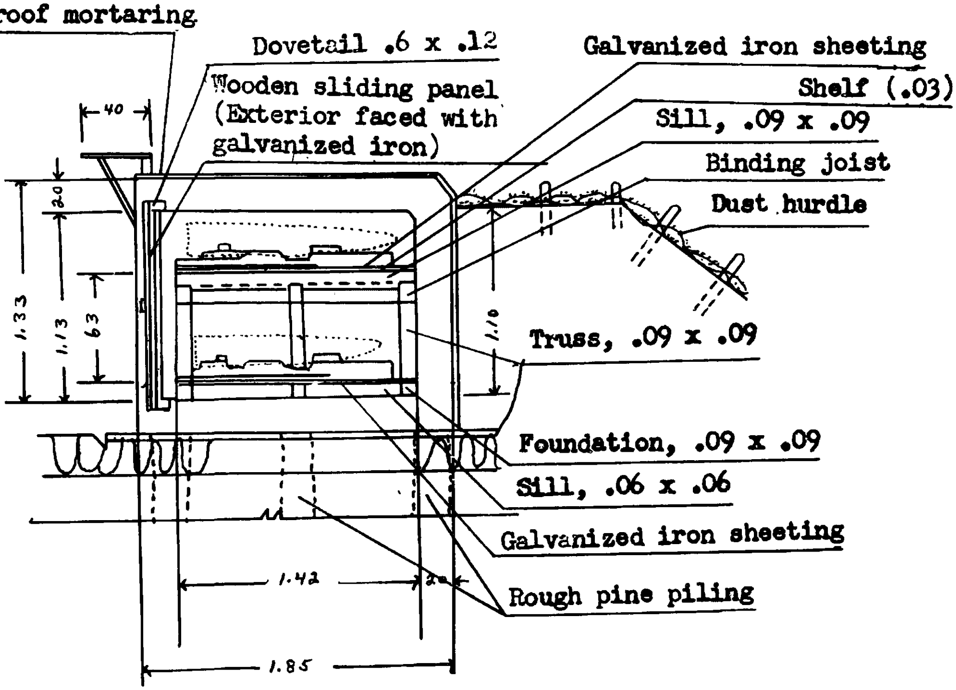
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

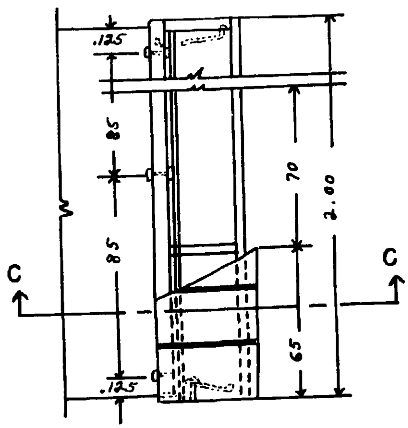
DETAILS OF READY MAGAZINE (Continued)

SECTION A-A

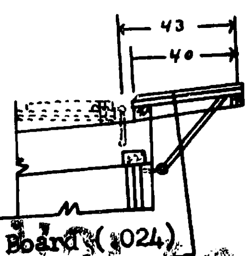


DETAIL OF AMMO LOCKER

PLAN CROSS SECTION



SECTION C-C



IX - ANTI-AIRCRAFT INSTALLATIONS

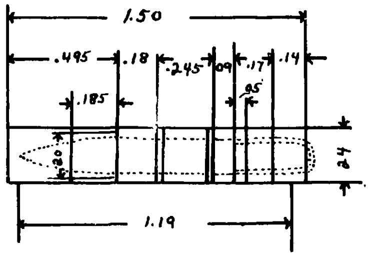
EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

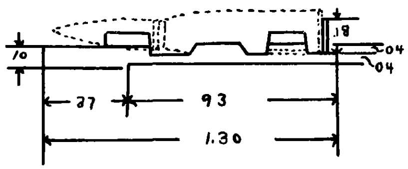
DETAILS OF READY MAGAZINE (Continued)

DETAIL OF SKID

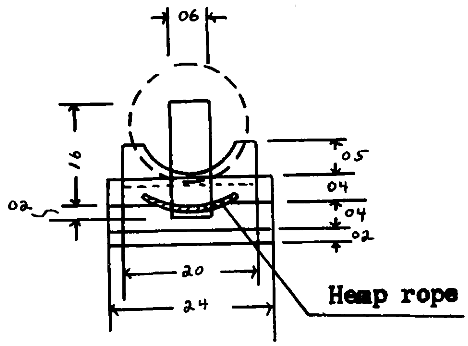
PLAN CROSS SECTION



SIDE VIEW



FRONT VIEW

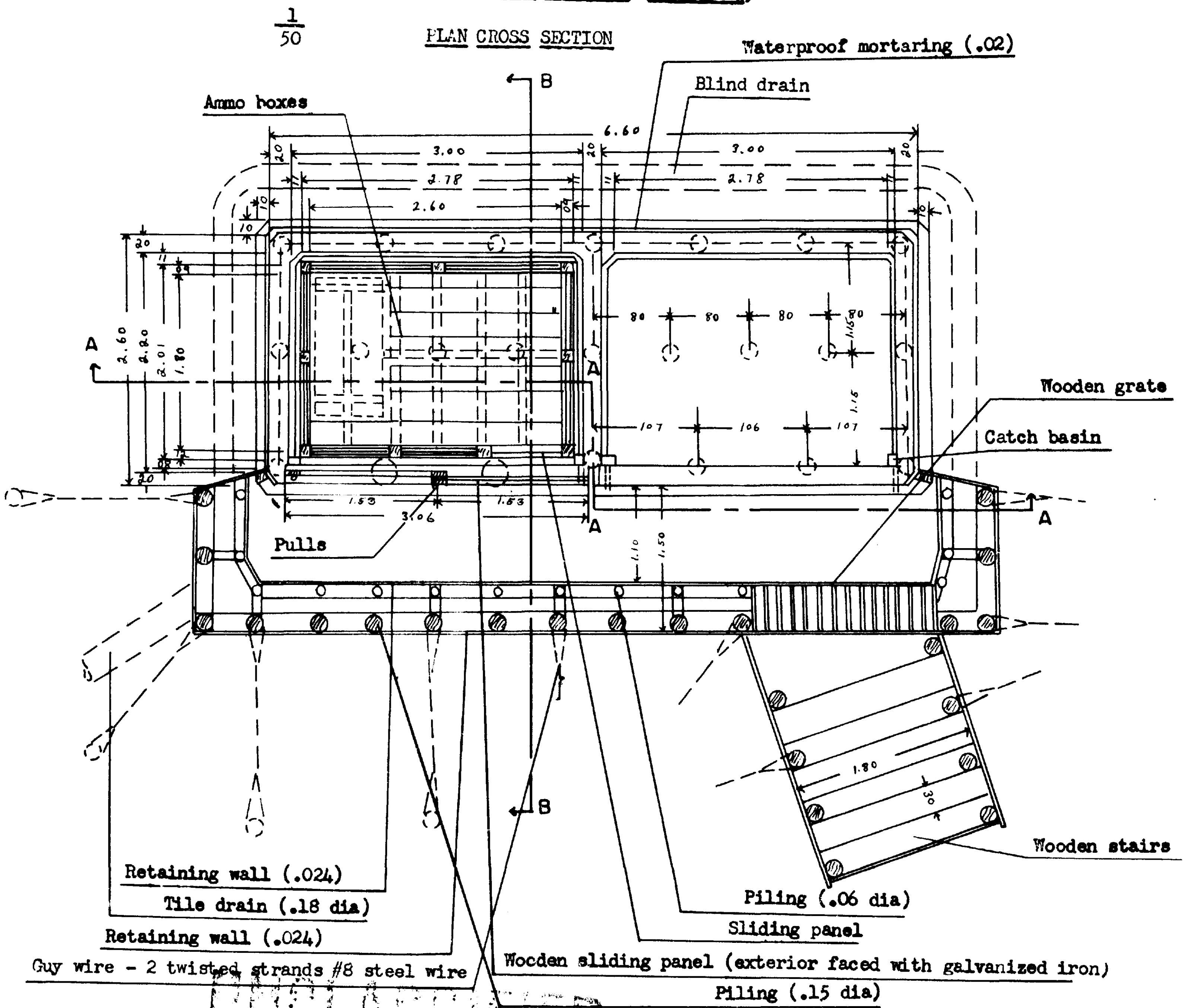


I. ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

DETAILS OF READY MAGAZINE (Continued)

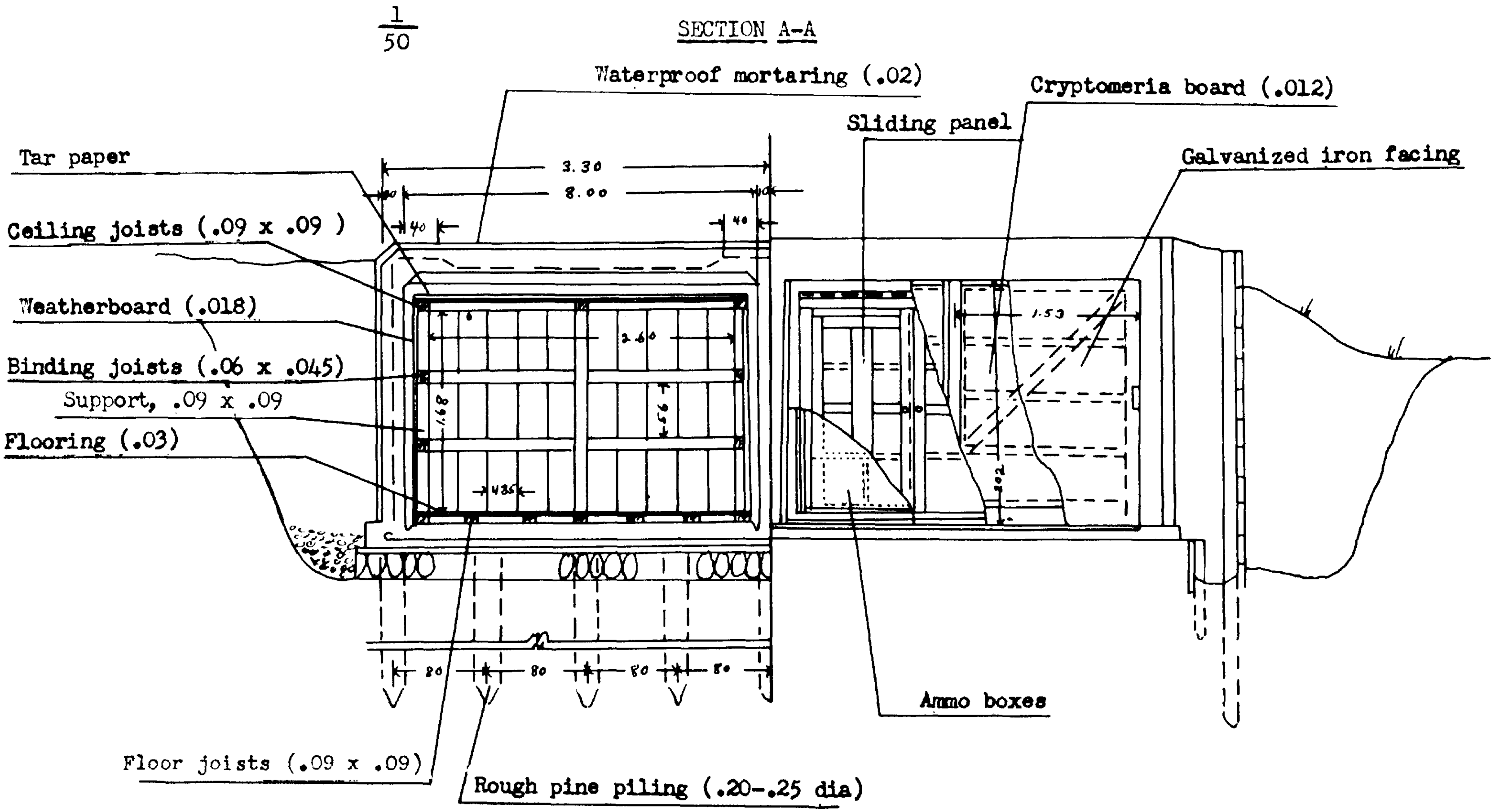


IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

DETAILS OF READY MAGAZINE (Continued)



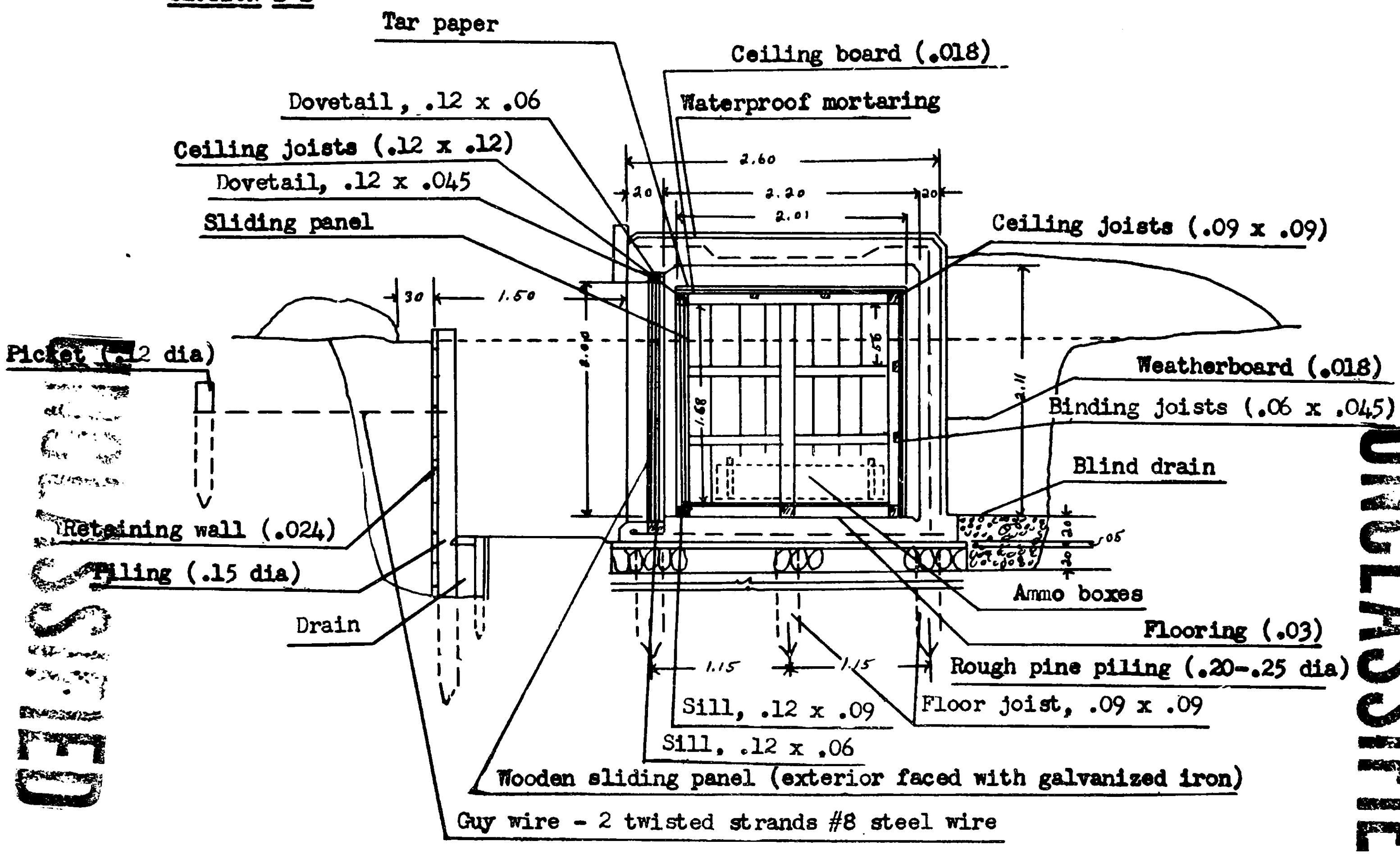
IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

C - 12cm AA GUN (Continued)

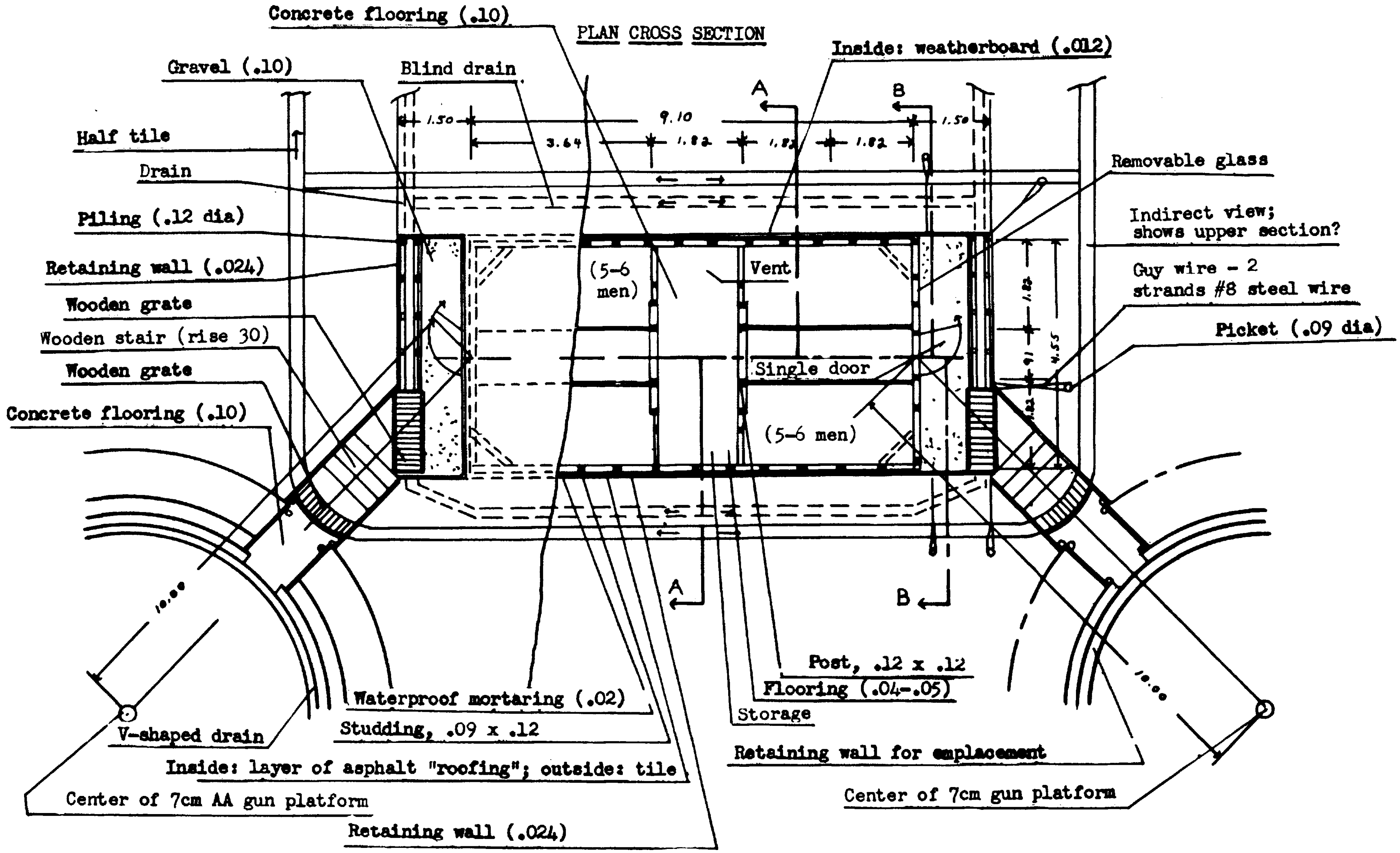
DETAILS OF READY MAGAZINE (Continued)

SECTION B-B



IX - ANTI-AIRCRAFT INSTALLATIONS

READY STATION FOR GUN CREWS (7cm, 8cm, 12cm AA GUNS)



Notes

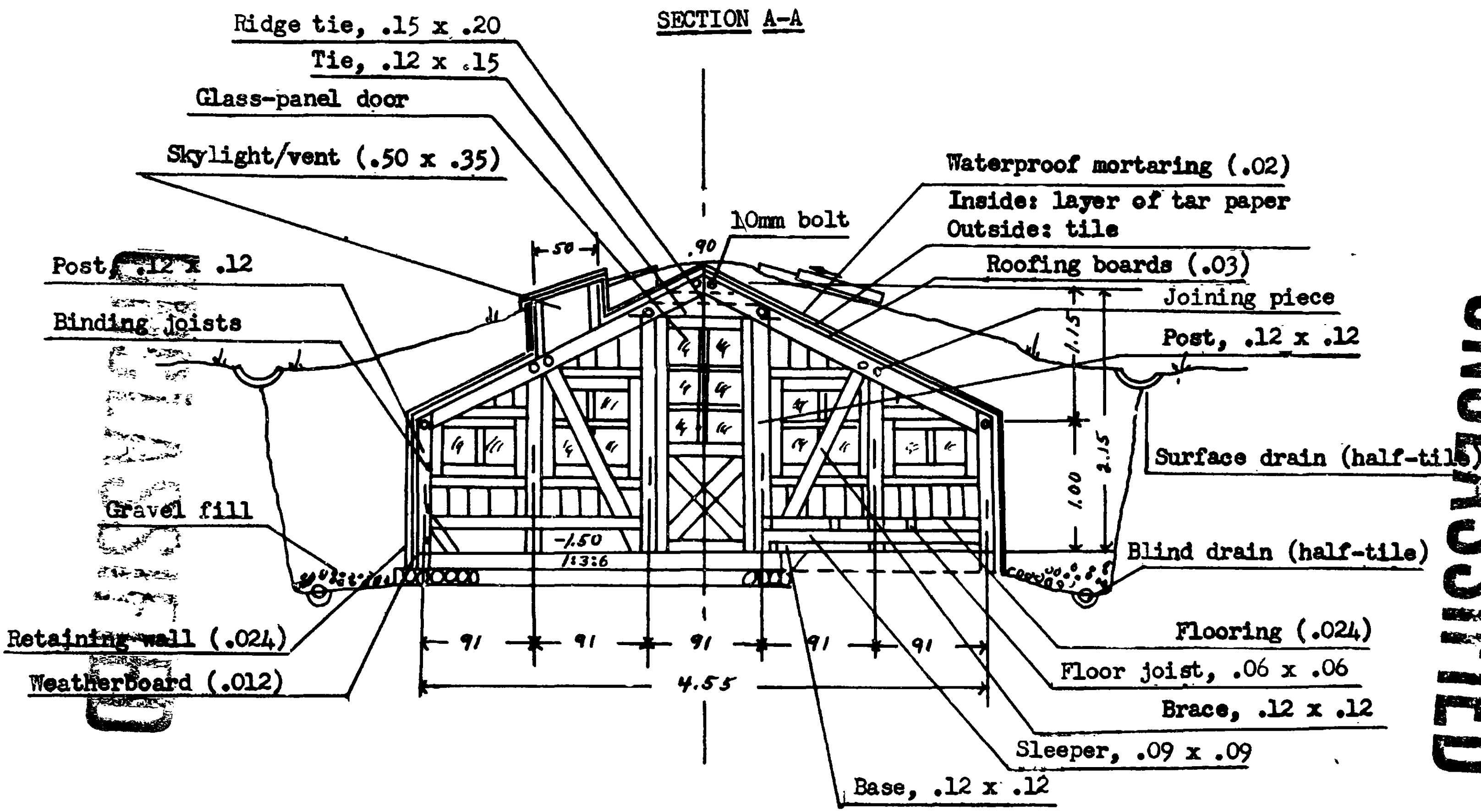
1. The passageway connecting with the gun platform is the type used with the 7cm AA gun.
2. In areas where rainfall is heavy, a rain cover is installed on top of the entrance trench; this is not to exceed the 90cm height level of the site.
3. A black-out cover is put on the inner side of the glass door and black-out paper is attached to glass (windows)
4. The room is equipped with the necessary tool racks.
5. Glass is not used in the skylight/vent.

IX - ANTI-AIRCRAFT INSTALLATIONS

EMPLACEMENTS (Continued)

D - READY STATION FOR GUN CREWS (7cm, 8cm, 12cm AA GUNS) (Continued)

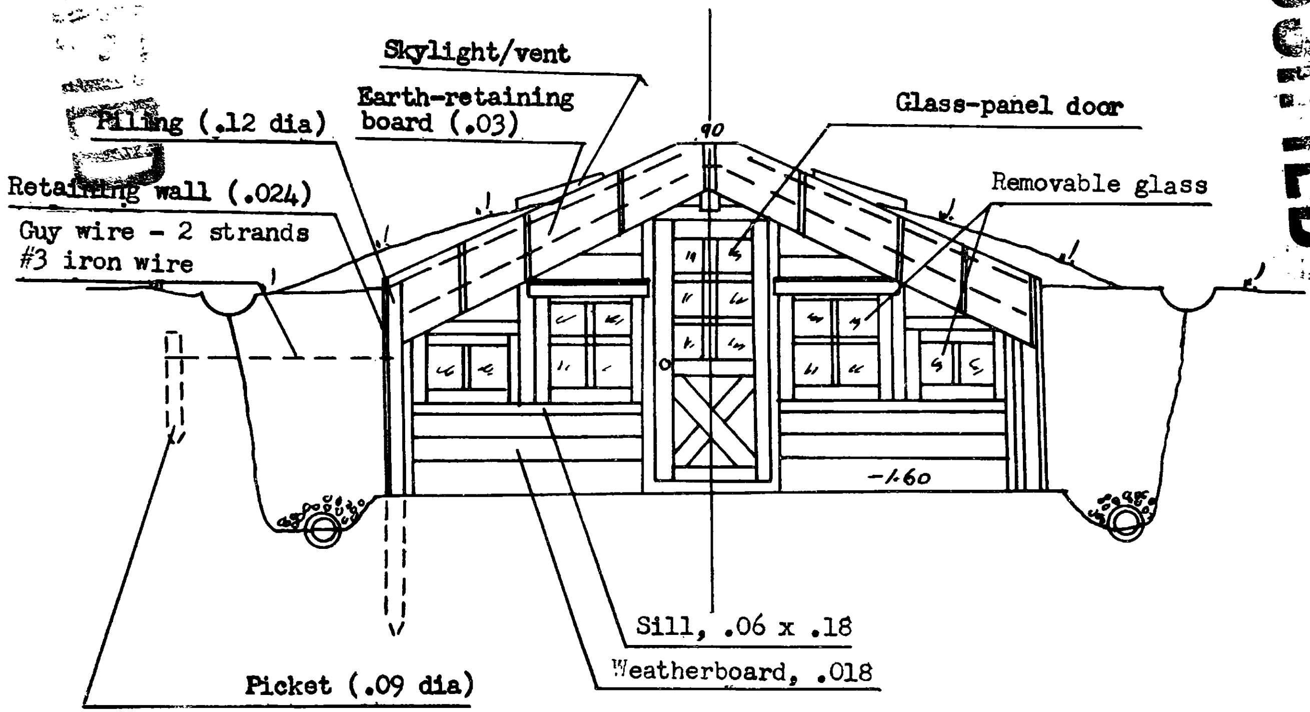
SECTION A-A

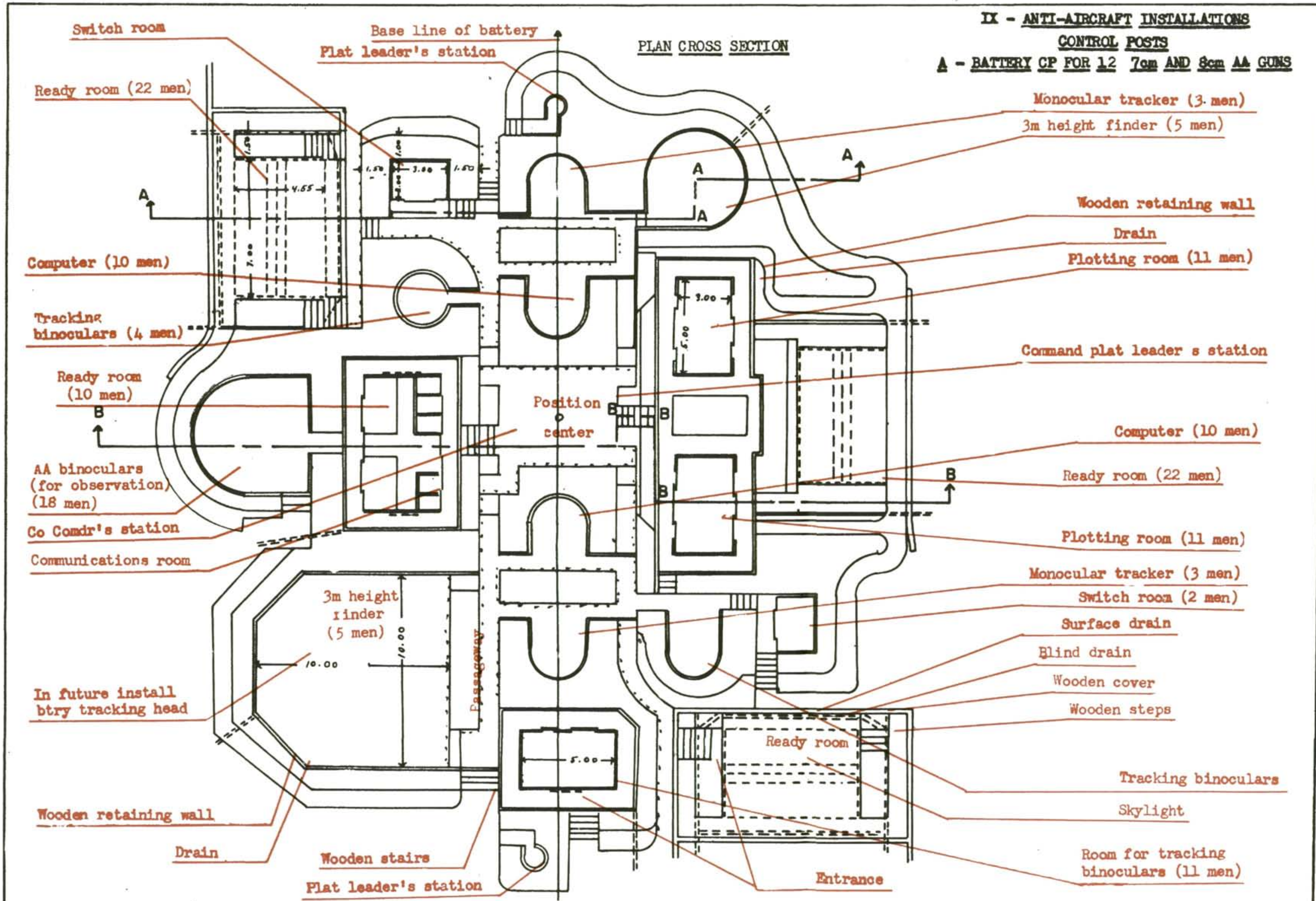


IX - ANTI-AIRCRAFT INSTALLATIONS
EMPLACEMENTS (Continued)

D - READY STATION FOR GUN CREWS (7cm, 8cm, 12cm AA GUNS) (Continued)

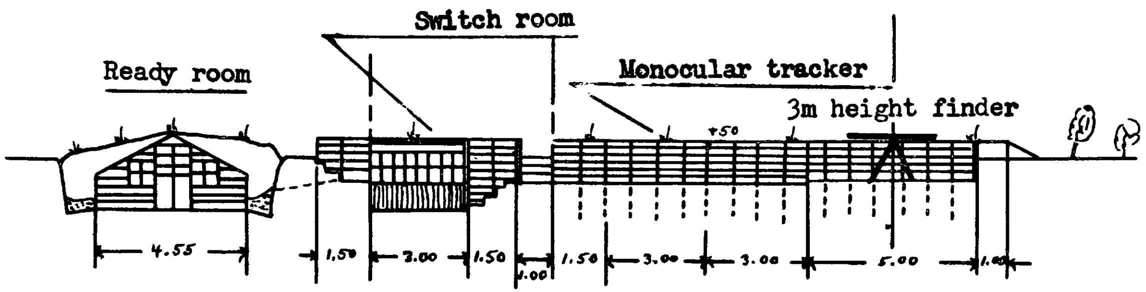
SECTION B-B



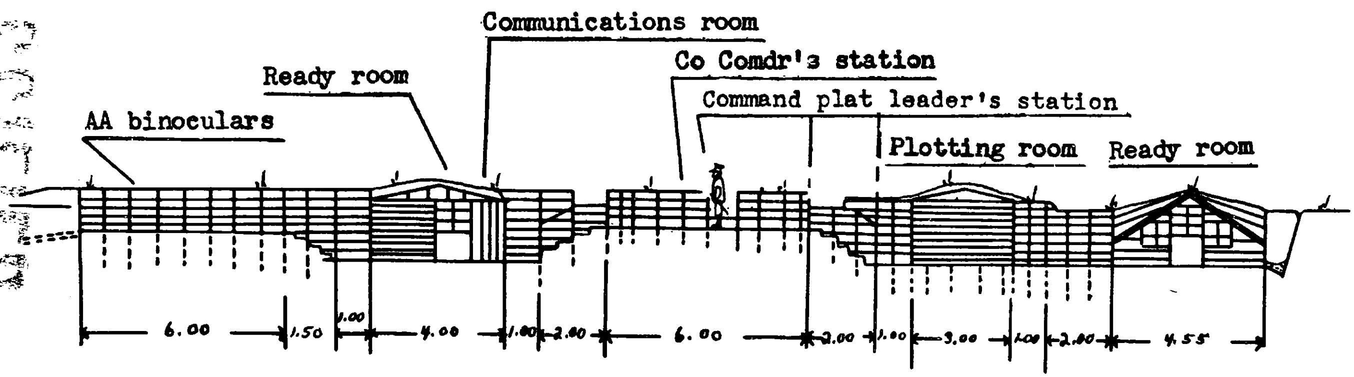

IX - ANTI-AIRCRAFT INSTALLATIONS
CONTROL POSTS
A - BATTERY CP FOR 12 7cm AND 8cm AA GUNS
PLAN CROSS SECTION
Switch room
Base line of battery
Plat leader's station
Ready room (22 men)
Monocular tracker (3 men)
3m height finder (5 men)
Wooden retaining wall
Drain
Plotting room (11 men)
Computer (10 men)
Tracking binoculars (4 men)
Command plat leader s station
Ready room (10 men)
Position center
AA binoculars (for observation) (18 men)
Computer (10 men)
Ready room (22 men)
Co Comdr's station
Plotting room (11 men)
Communications room
Monocular tracker (3 men)
Switch room (2 men)
3m height finder (5 men)
Surface drain
Blind drain
Wooden cover
In future install btry tracking head
Wooden steps
Passageway
Ready room
Tracking binoculars
Skylight
Wooden retaining wall
Drain
Wooden stairs
Plat leader's station
Entrance
Room for tracking binoculars (11 men)
A
B
4.55
7.00
1.50
3.00
1.50
3.00
5.00
10.00
10.00
5.00

IX - ANTI-AIRCRAFT INSTALLATIONS
CONTROL POSTS (Continued)
A - BATTERY CP FOR 12 7cm AND 8cm AA GUNS (Continued)

SECTION A-A

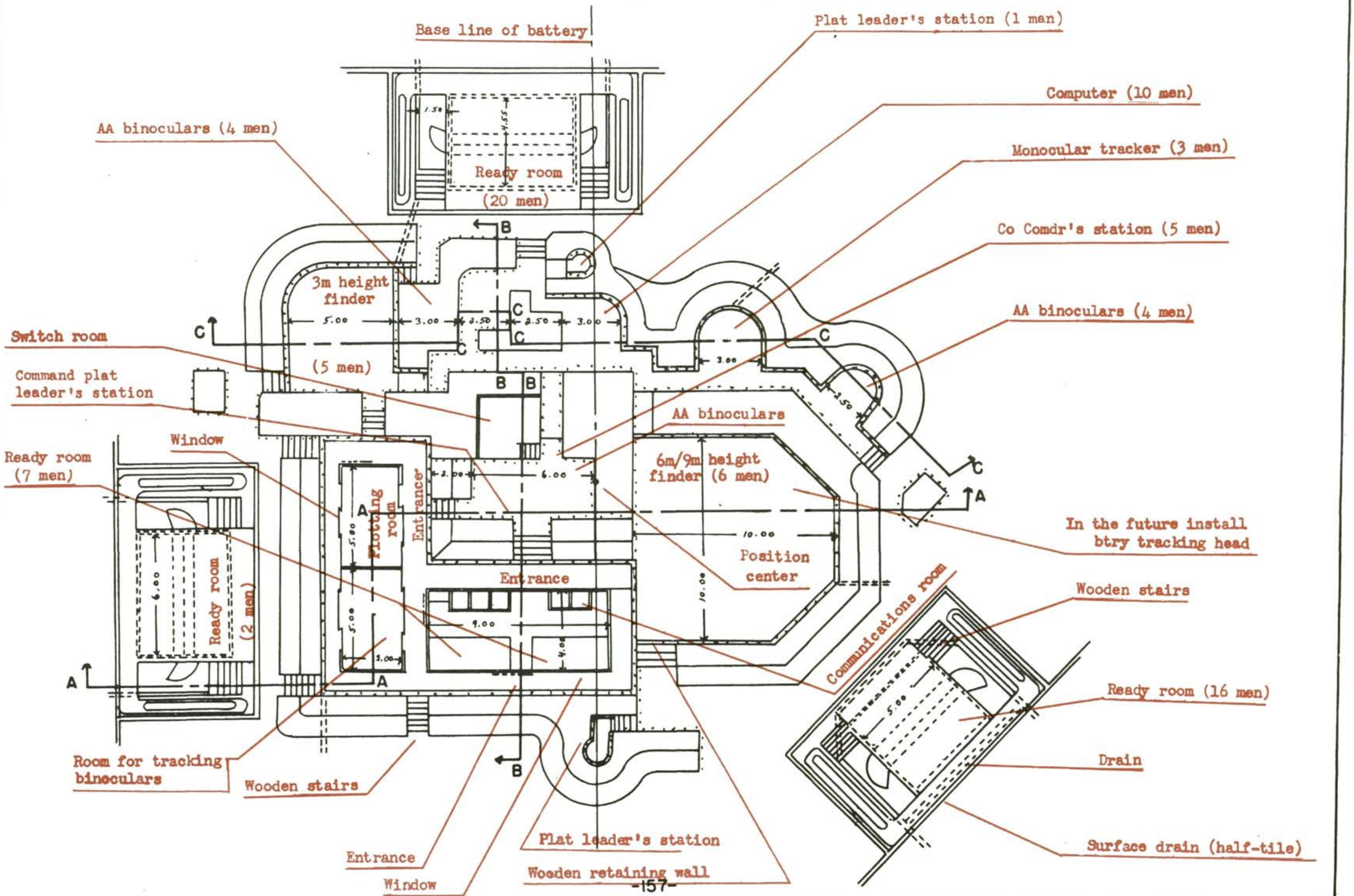


SECTION B-B



IX - ANTI-AIRCRAFT INSTALLATIONS
CONTROL POSTS (Continued)
B - BATTERY CP FOR 6 12cm AA GUNS

PLAN CROSS SECTION

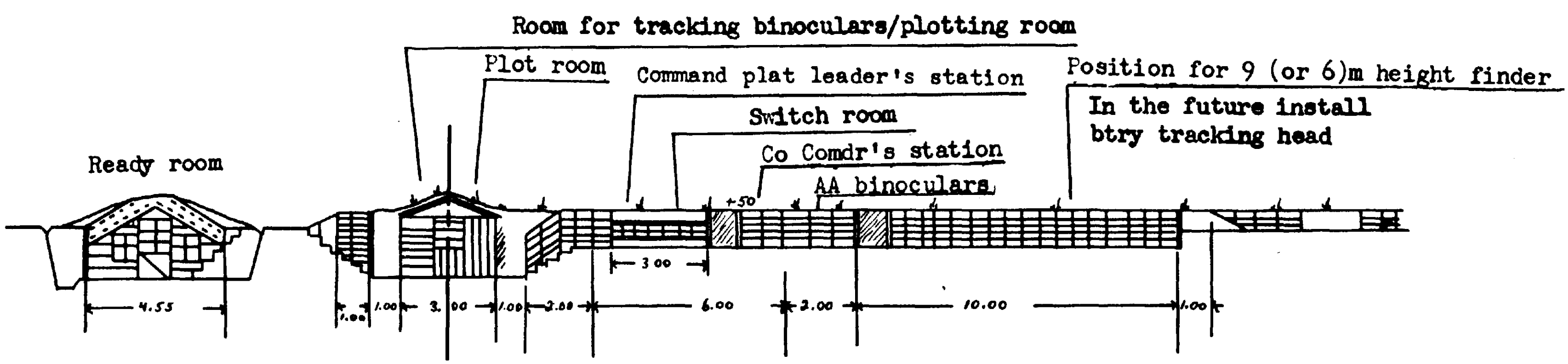


IX - ANTI-AIRCRAFT INSTALLATIONS

CONTROL POSTS (Continued)

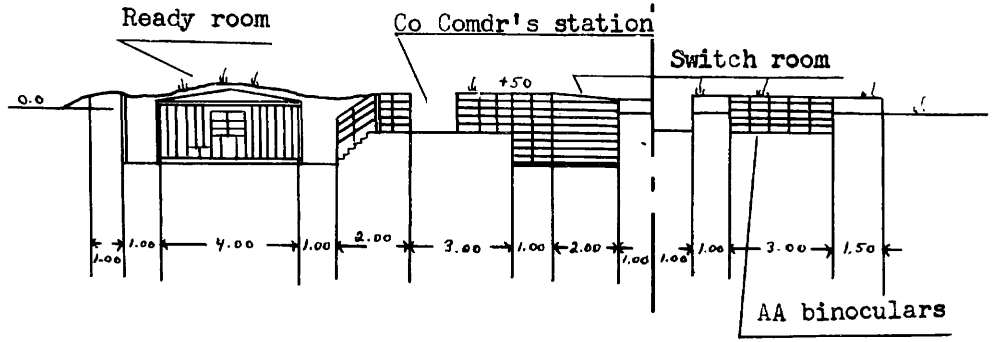
B - BATTERY CP FOR 6 12cm AA GUNS (Continued)

1/200 SECTION A-A

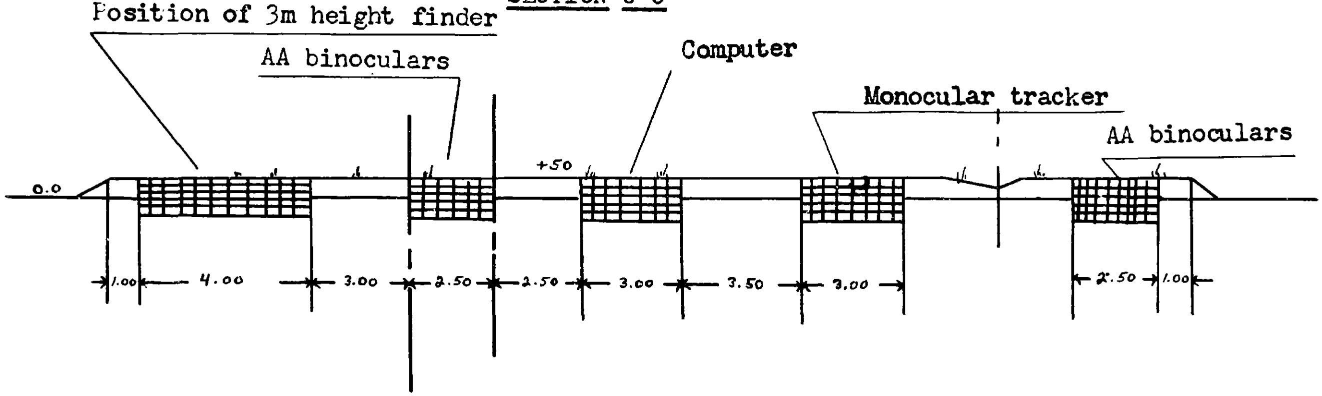


IX - ANTI-AIRCRAFT INSTALLATIONS
CONTROL POSTS (Continued)
B - BATTERY CP FOR 6 12cm AA GUNS (Continued)

SECTION B-B



SECTION C-C

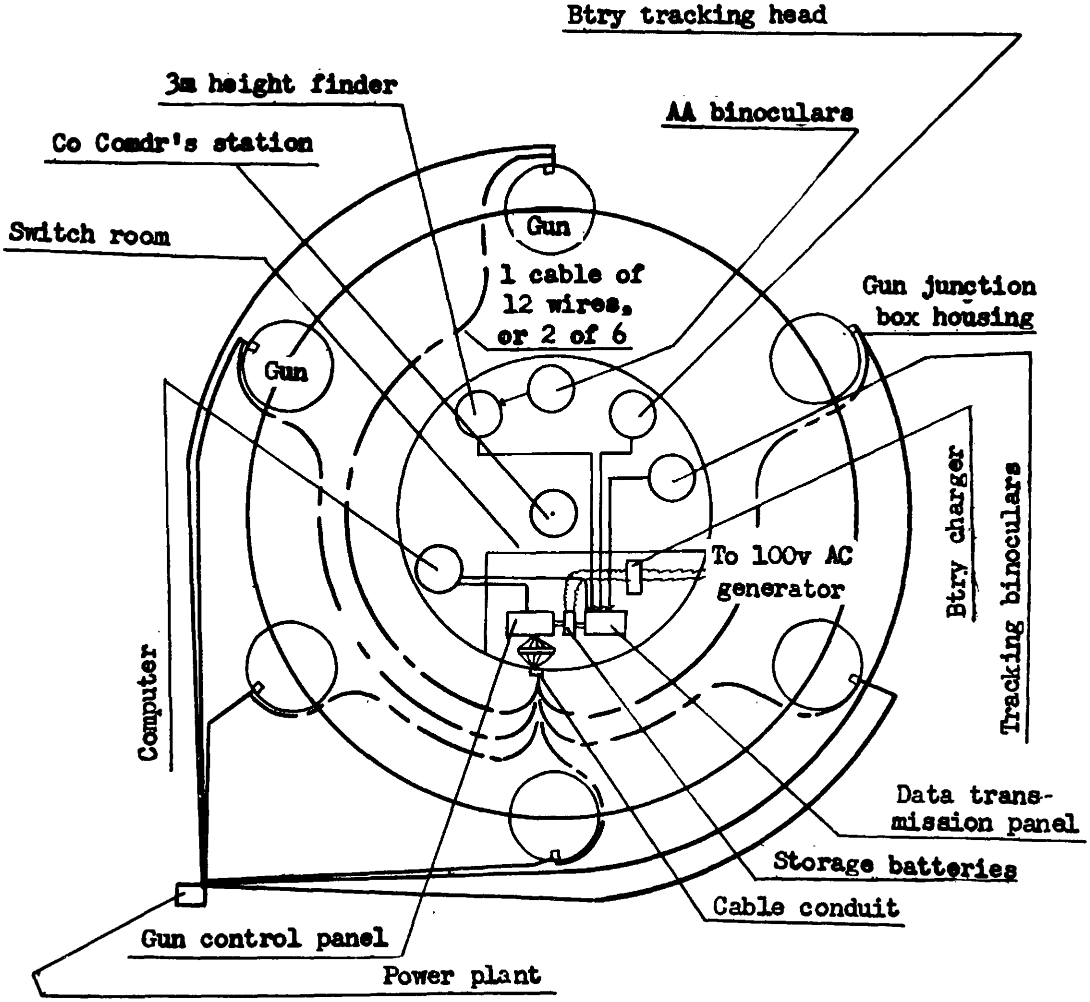


UNCLASSIFIED

II - ANTI-AIRCRAFT INSTALLATIONS

WIRING OF FIRE CONTROL FOR AA GUNS

A - BATTERY OF 6 12cm AA GUNS

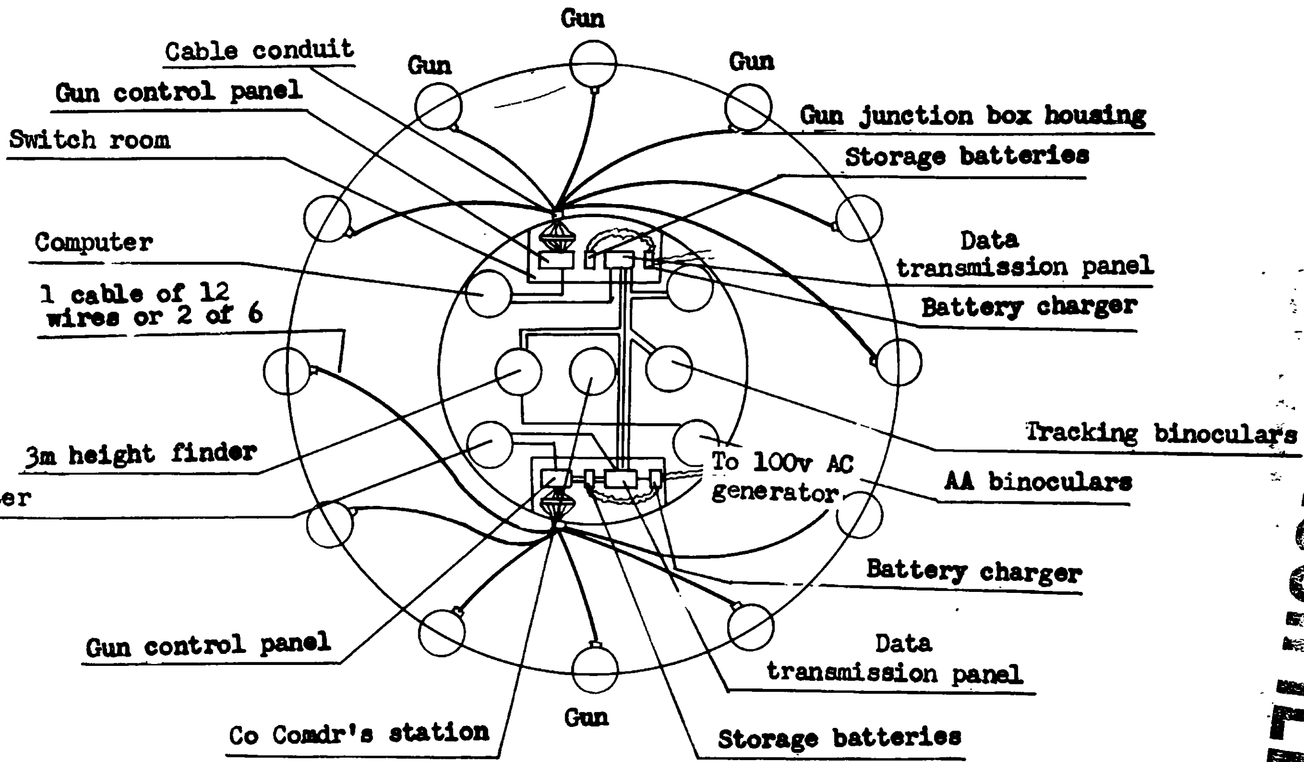


1. ——indicates cable used in operating gun carriage. (8 sq mm of 7/12 steel tape-armored cable).
2. - - indicates wiring for fire control.
3. Wiring of fire control for 7cm AA gun and junction box housing does not follow the above plan.
4. Gun junction box, switch room, main junction box, and the cables connecting them to be installed at time of construction.

IX - ANTI-AIRCRAFT INSTALLATIONS

WIRING OF FIRE CONTROL FOR AA GUNS (Continued)

B - BATTERY OF 12 8cm AA GUNS

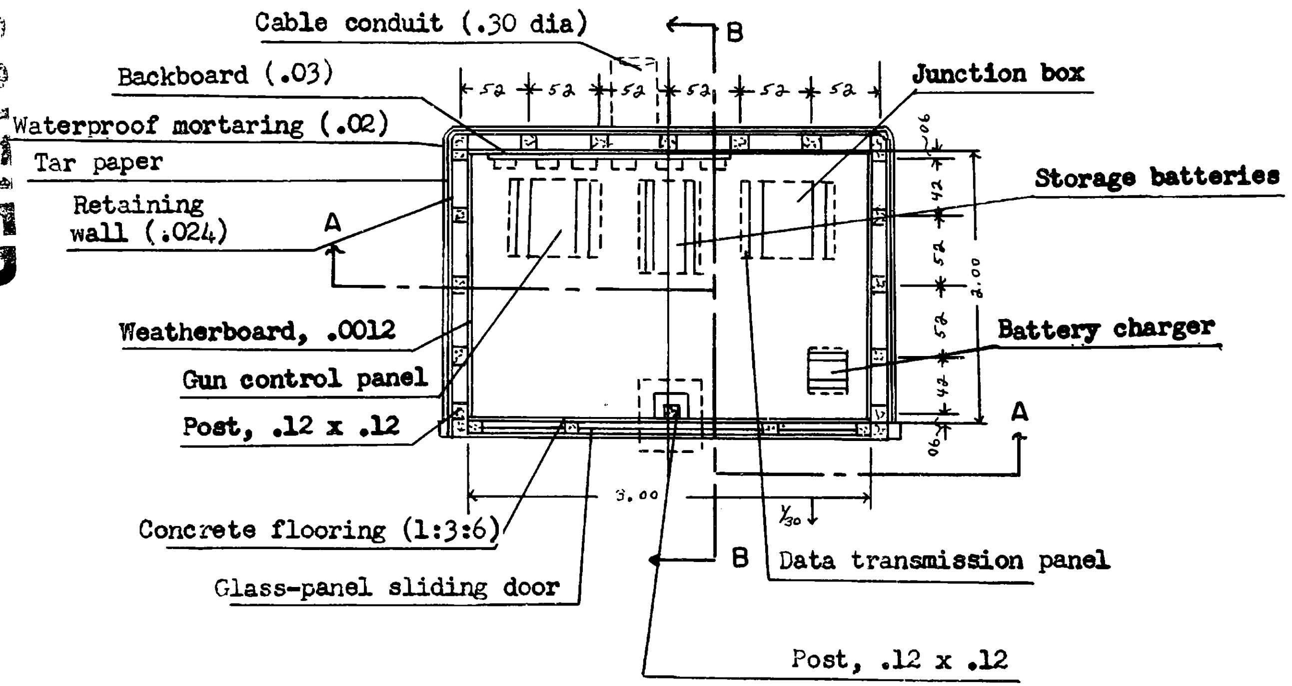


IX - ANTI-AIRCRAFT INSTALLATIONS

WIRING OF FIRE CONTROL FOR AA GUNS (Continued)

C - CONTROL ROOM

PLAN CROSS SECTION

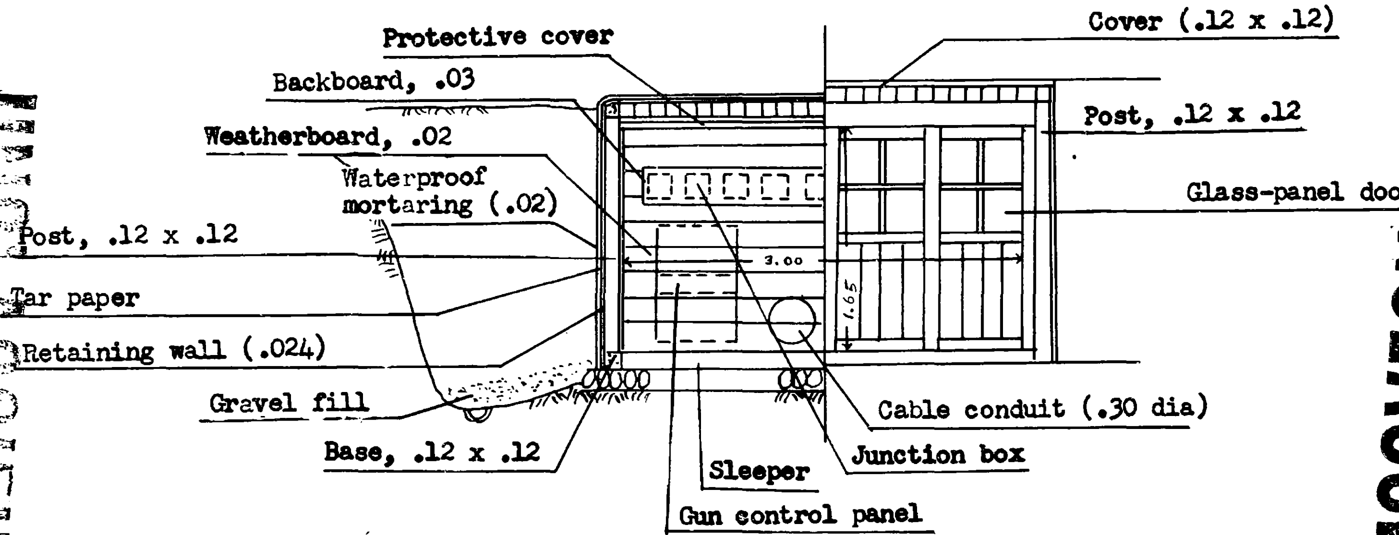


IX - ANTI-AIRCRAFT INSTALLATIONS

WIRING OF FIRE CONTROL FOR AA GUNS (Continued)

C - CONTROL ROOM (Continued)

SECTION A-A

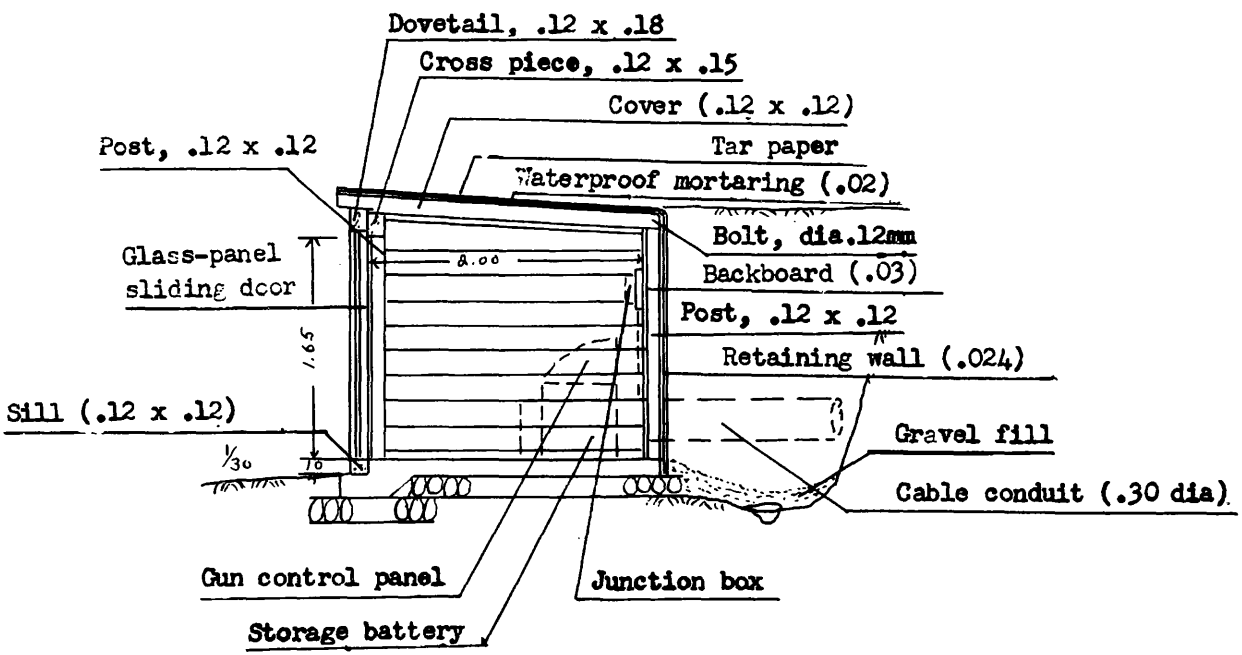


IX - ANTI-AIRCRAFT INSTALLATIONS

WIRING OF FIRE CONTROL FOR AA GUNS (Continued)

C - CONTROL ROOM (Continued)

SECTION B-B

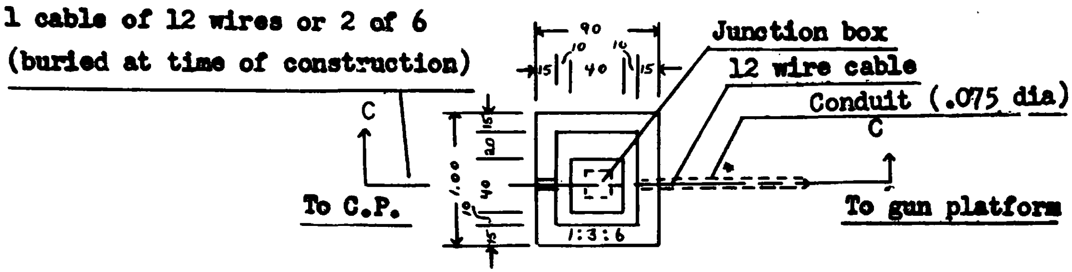


IX - ANTI-AIRCRAFT INSTALLATIONS

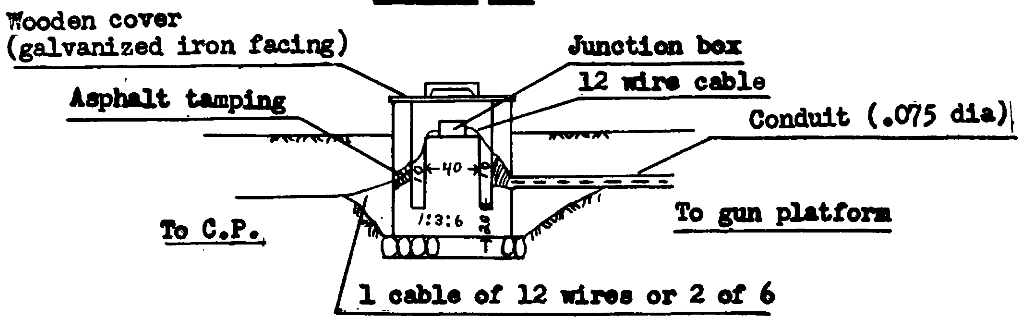
WIRING OF FIRE CONTROL FOR AA GUNS (Continued)

D - JUNCTION BOX

PLAN CROSS SECTION



SECTION C-C



IX - ANTI-AIRCRAFT INSTALLATIONS

ELEVATION OF SECTION OF BATTERY SHOWING RELATION BETWEEN ANGLES OF ELEVATION OF GUNS AND HEIGHTS OF STRUCTURES

A - 7cm AA GUN

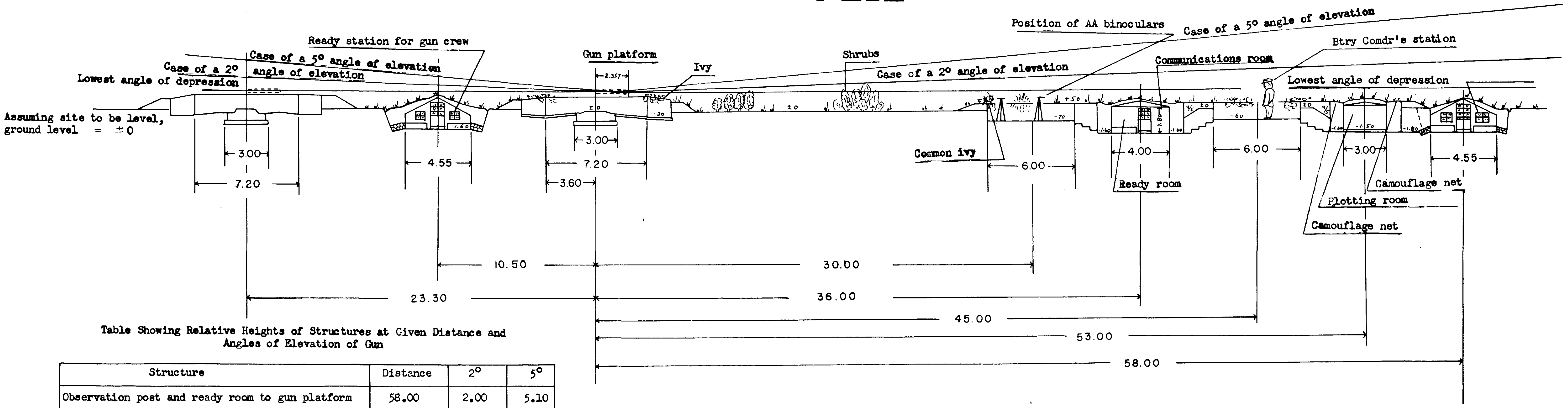


Table Showing Relative Heights of Structures at Given Distance and Angles of Elevation of Gun

Structure	Distance	2°	5°
Observation post and ready room to gun platform	58.00	2.00	5.10
Plotting room to gun platform	53.00	1.85	4.65
Command platform to gun platform	45.00	1.57	3.94
Communications room to gun platform	36.00	1.26	3.15
AA binocular position to gun platform	30.00	1.05	2.60
Contiguous gun platform to gun platform	23.30	0.82	2.00
Ready station for gun crew to gun platform	10.50	0.37	

Note: The base line of the angle is computed by taking the 1.302m height of the gun's axle as the base.

IX - ANTI-AIRCRAFT INSTALLATIONS

ELEVATION OF SECTION OF BATTERY SHOWING RELATION BETWEEN ANGLES OF ELEVATION OF GUNS AND HEIGHTS OF STRUCTURES (Continued)

B - 8cm AA GUN

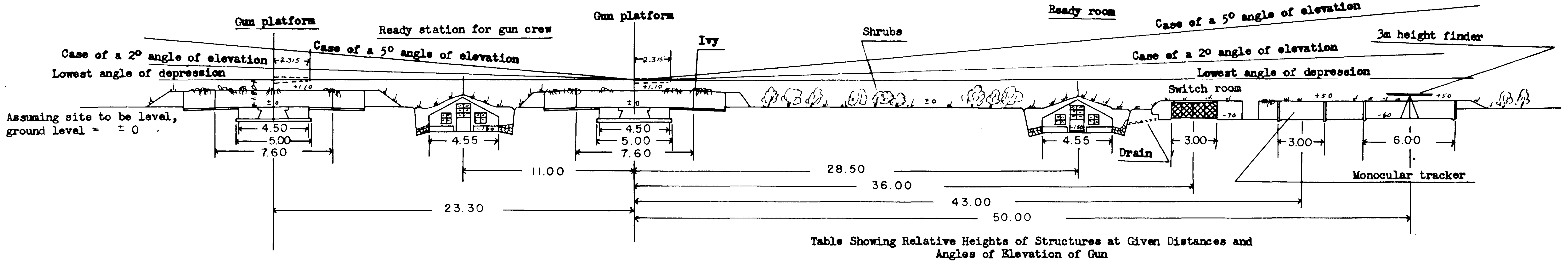


Table Showing Relative Heights of Structures at Given Distances and Angles of Elevation of Gun

Structure	Distance	2°	5°
3m height finder to gun platform	50.00	1.75	4.35
Monocular tracker to gun platform	43.00	1.50	3.72
Switch room to gun platform	36.00	1.26	3.14
Ready room to gun platform	28.50	1.00	2.48
Contiguous gun platform to gun platform	23.30	0.82	2.00
Ready station for gun crew to gun platform	11.00	0.38	0.95

Note: The base line of the angle is computed by taking the 1.80m height of the guns axle as the base.

IX - ANTI-AIRCRAFT INSTALLATIONS

ELEVATION OF SECTION OF BATTERY SHOWING RELATION BETWEEN ANGLES OF ELEVATION OF GUNS AND HEIGHTS OF STRUCTURES (Continued)

C - 12cm AA GUN

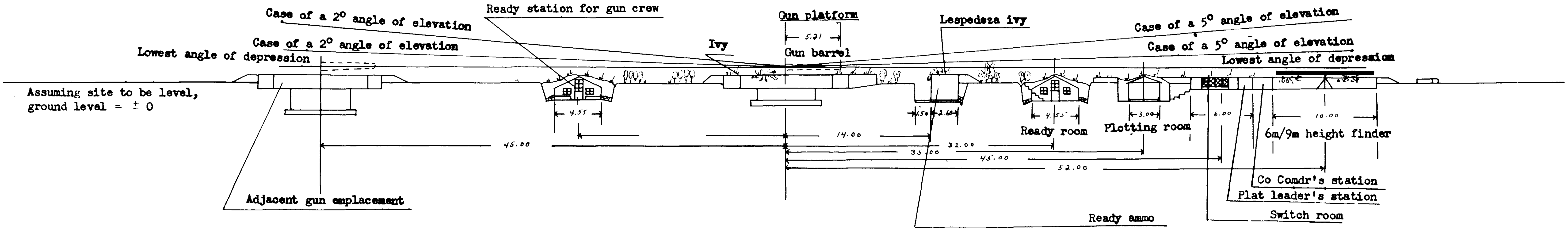


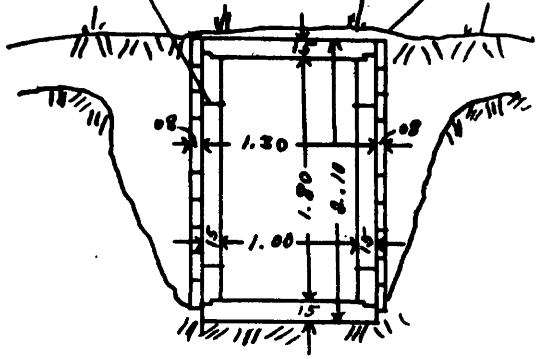
Table Showing Relative Heights of Structures at Given Distances and Angles of Elevation of Gun

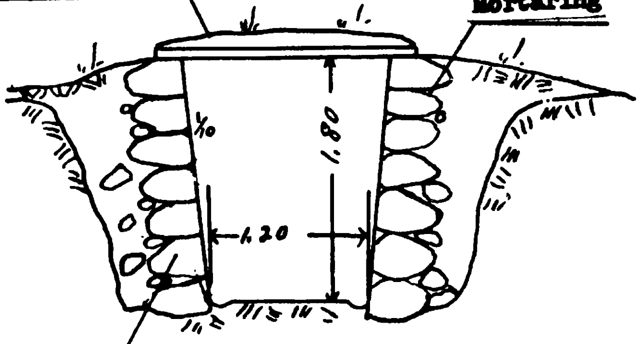
Name of Building	Distance (from gun platform) in meters	2°	5°
Ready ammo locker	14.00	0.49	1.22
Ready station for gun crew	20.00	0.70	1.75
Ready/observation room	32.00	1.10	2.80
Plotting room	35.00	1.22	3.10
Adjacent gun platform	45.00	1.58	3.92
Comdr's station	45.00	1.58	3.92
Height finder	52.00	1.82	4.55

Note: The base line of the angle is computed by taking the 1.50m height of the gun's axle as base.

DIAGRAM #2 (Cont'd.)

X - OPEN COMMUNICATION TRENCHES

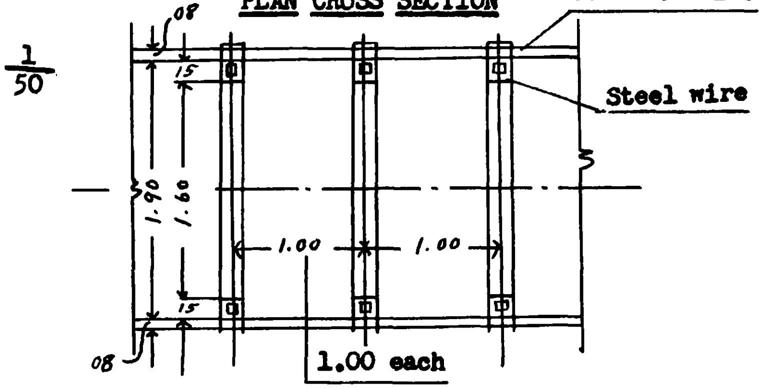




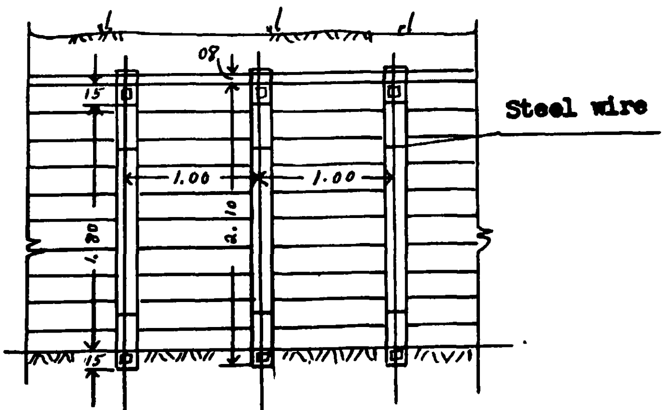
XI - UNDERGROUND PASSAGEWAYS

/TYPE I/
(A)

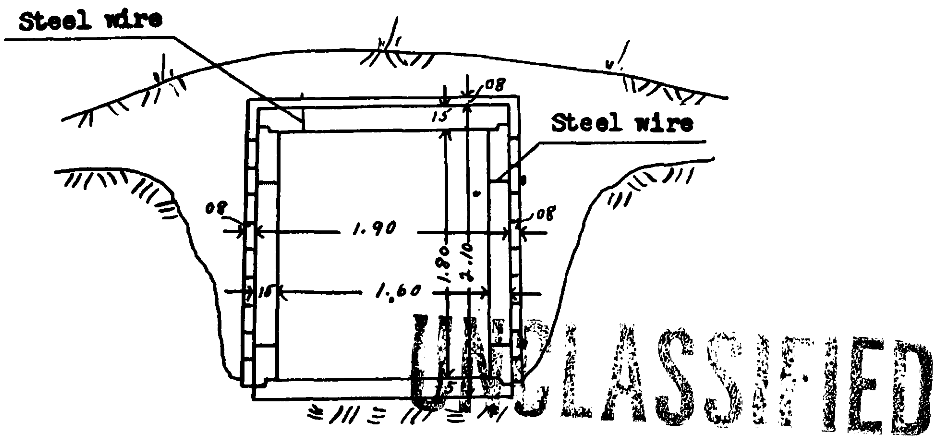
PLAN CROSS SECTION



LONGITUDINAL CROSS SECTION



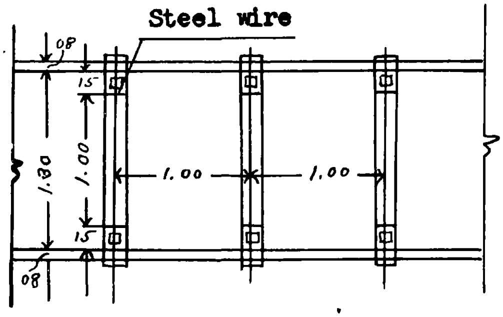
TRANSVERSE CROSS SECTION



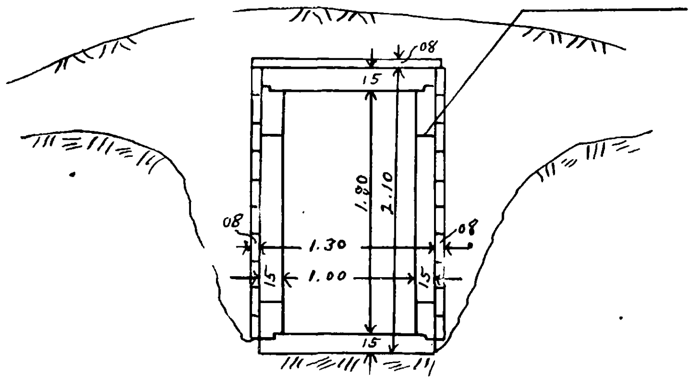
XI. UNDERGROUND PASSAGEWAYS

/TYPE I/
(B)

PLAN CROSS SECTION



TRANSVERSE CROSS SECTION

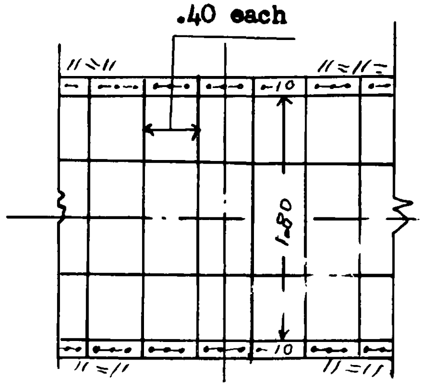


(TN: Same longitudinal cross section as (A))

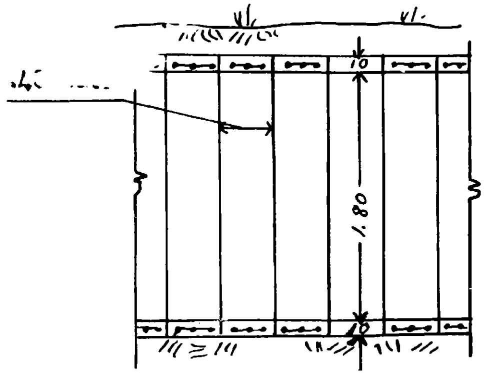
XI - UNDERGROUND PASSAGEWAYS

HORSESHOE-SHAPED
(A)

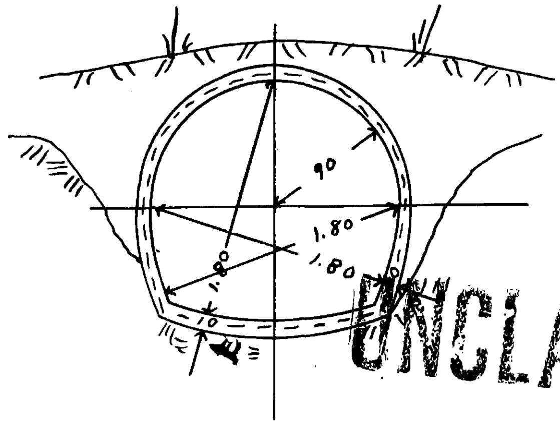
PLAN CROSS SECTION



LONGITUDINAL CROSS SECTION



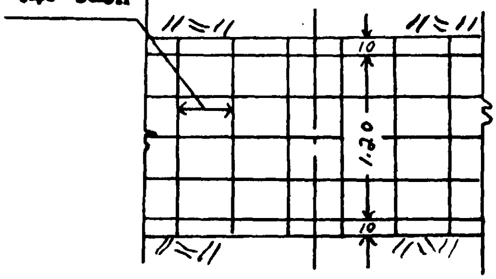
TRANSVERSE CROSS SECTION



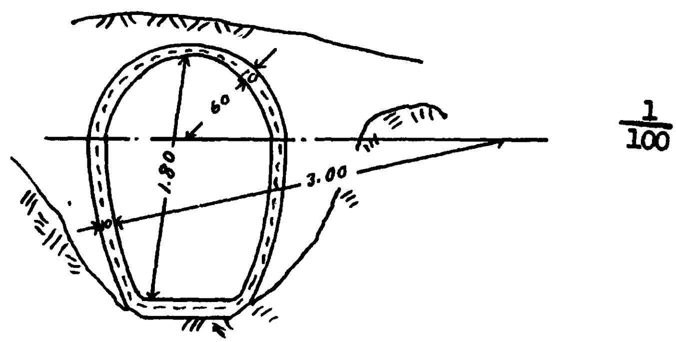
XI - UNDERGROUND PASSAGEWAYS

HORSESHOE-SHAPED
(B)

PLAN CROSS SECTION



TRANSVERSE CROSS SECTION



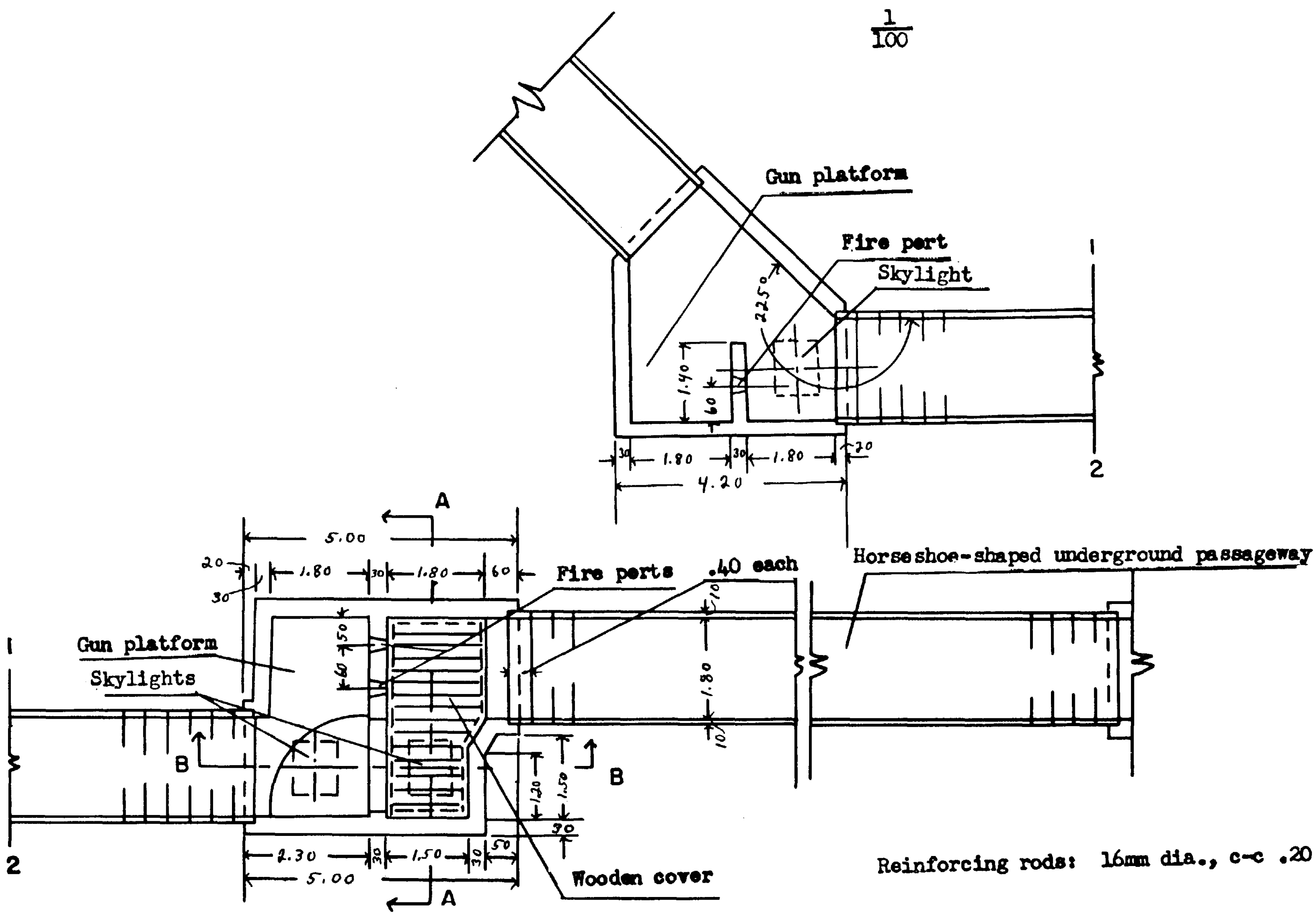
(TN: Same longitudinal cross section as (A))

Reinforcing rods: 6 or 9mm dia., c-c .15

XI - UNDERGROUND PASSAGEWAYS

ACCESSORIES FOR LONG LARGE UNDERGROUND PASSAGEWAY

PLAN CROSS SECTION



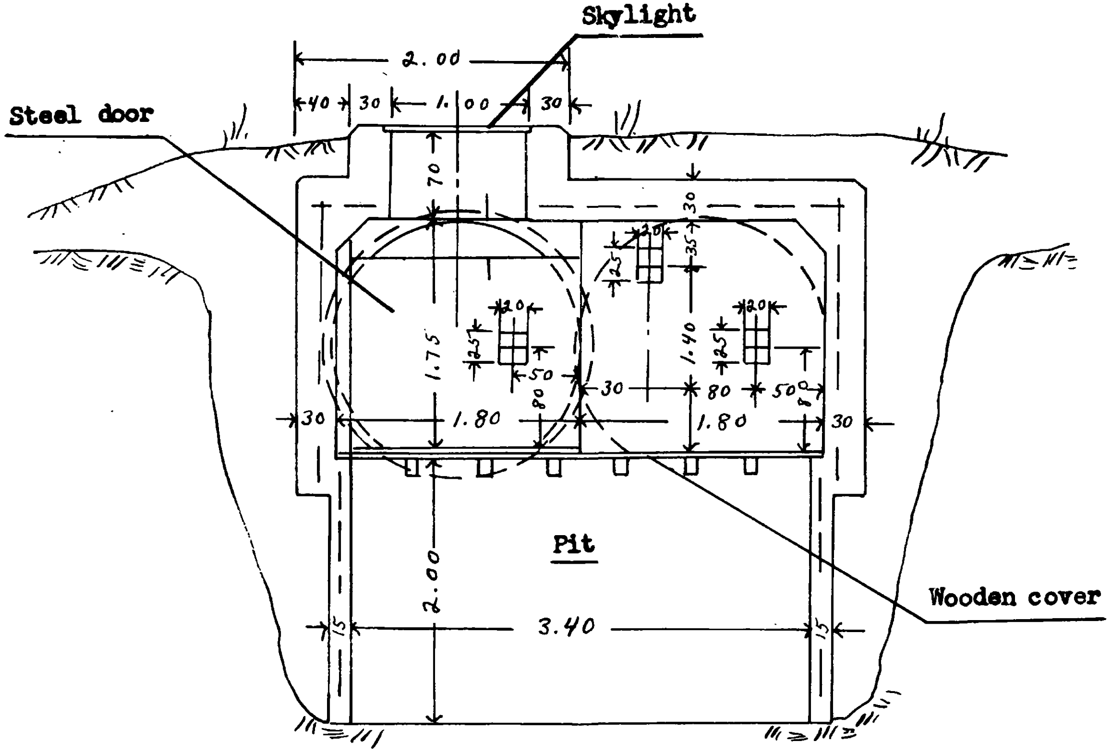
Reinforcing rods: 16mm dia., c-c .20

XI - UNDERGROUND PASSAGEWAYS

ACCESSORIES FOR LONG LARGE UNDERGROUND PASSAGEWAY (Continued)

SECTION A-A

1/50



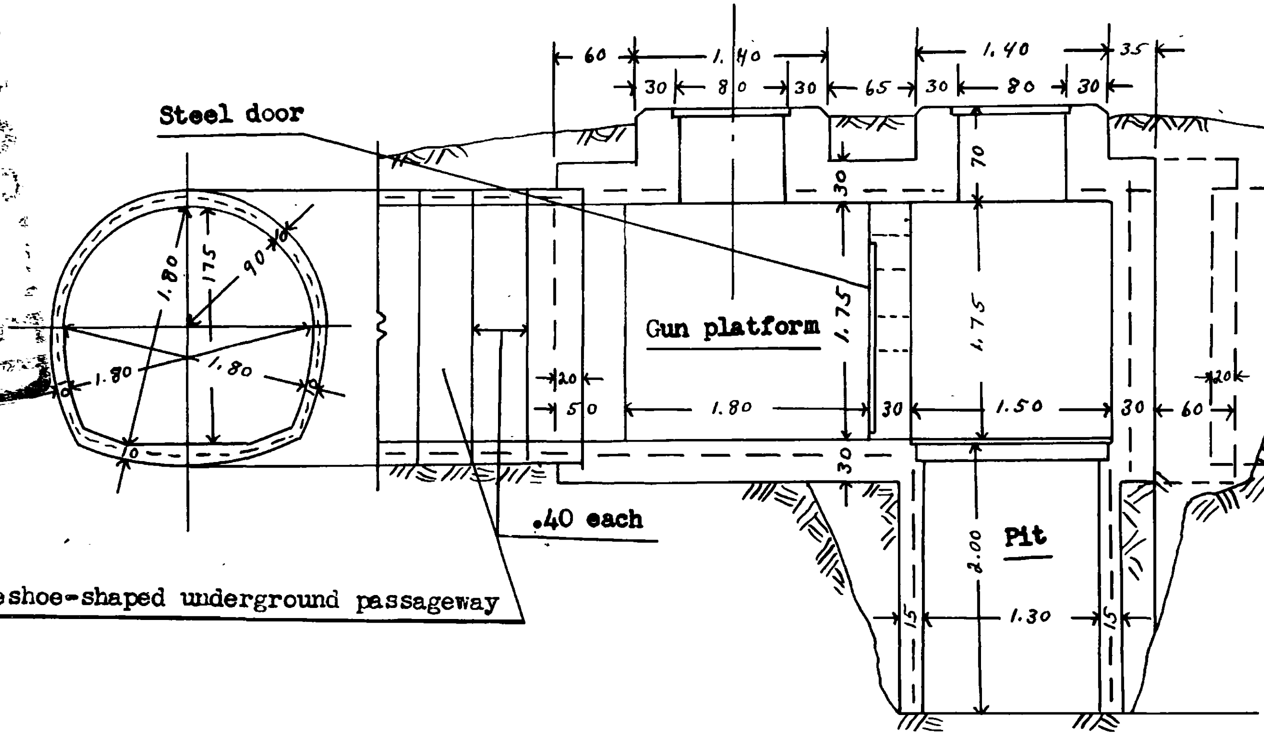
Reinforcing rods: 16mm dia., c-c .20

UNCLASSIFIED

XI - UNDERGROUND PASSAGEWAYS

ACCESSORIES FOR LONG LARGE UNDERGROUND PASSAGEWAY (Continued)

SECTION B-B



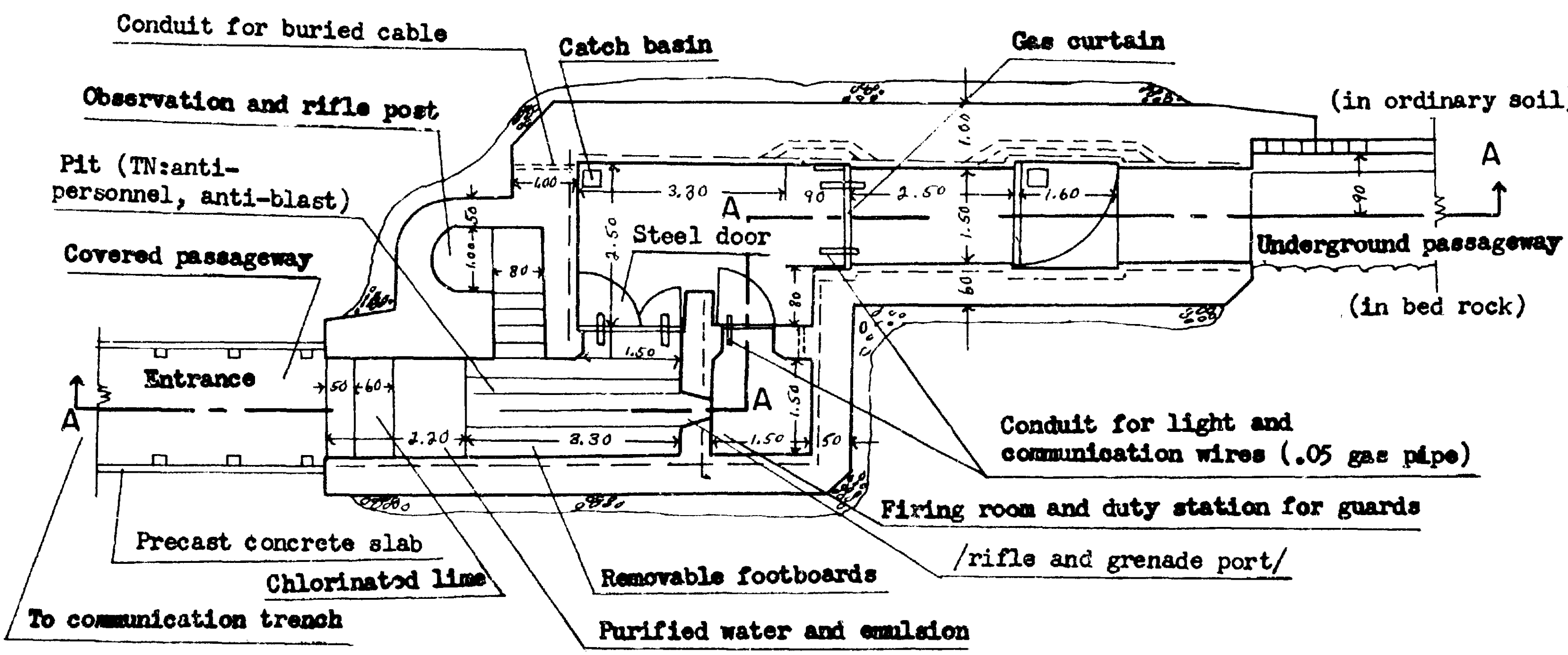
Reinforcing rods: 9mm dia., c-c .15
16mm dia., c-c .20

XP - UNDERGROUND PASSAGEWAYS

ENTRANCE TO UNDERGROUND PASSAGEWAY

1/100

PLAN CROSS SECTION



1. This diagram shows one type of entrance for an underground passageway (main line).
2. If necessary, the entrance-way and passageway may be connected by steps.
3. The reinforcement of the entrance-way is to be proportioned to the reinforcement of the underground passageway with which it connects.
4. The arrangement, foundation and drainage of each room should take into account factors of terrain, soil and directrix of the connecting underground passageway.
5. Endeavor to conceal the entrance by making combined use of covered passageways and dummy communication trenches.

List of Required Materials

Concrete.............155 cu m
Steel Reinforcement... 3 tons
Forms { inner.........165 sq m
 outer.........185 sq m
Broken Stone.......... 25 cu m

Accessories

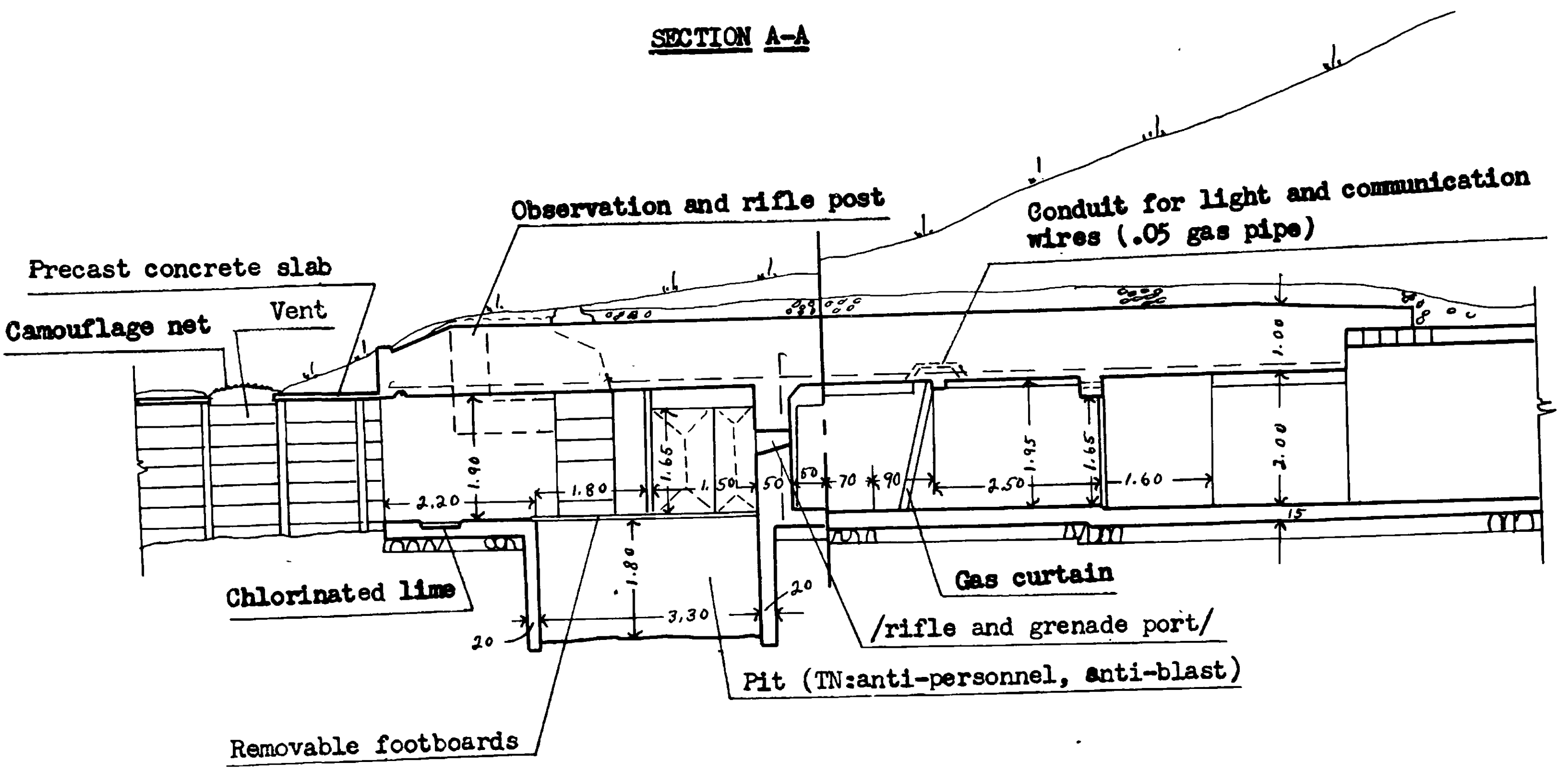
Steel cover.................1
Fire port door..............1
Steel doors, entrance.......3
Board cover, obstacle ditch..1
Gas curtain.................1
Drainage unit...............1
Miscellaneous...............

Reinforcing rods: 16mm dia., c-c .20
 16mm dia., c-c .40

XI - UNDERGROUND PASSAGEWAYS

ENTRANCE TO UNDERGROUND PASSAGEWAY (Continued)

SECTION A-A

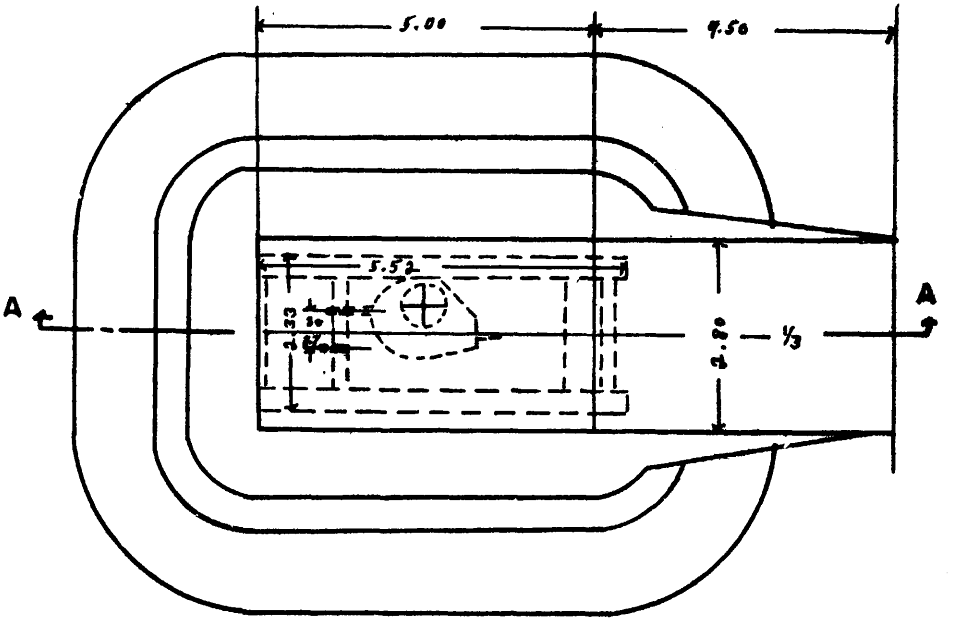


Reinforcing rods: 16mm dia., c-c .20

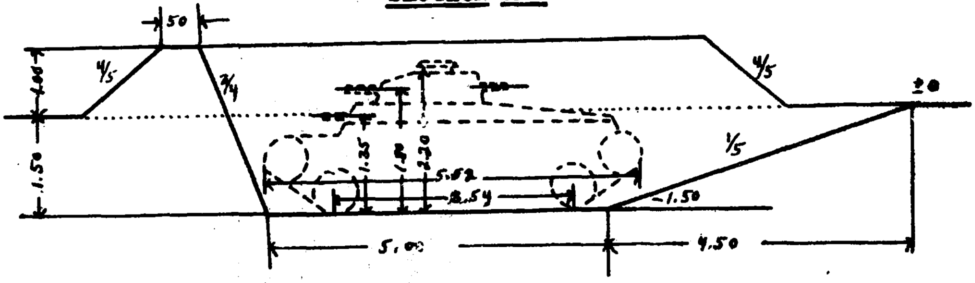
XII - REVETMENT

FOR TANK

PLAN CROSS SECTION



SECTION A-A

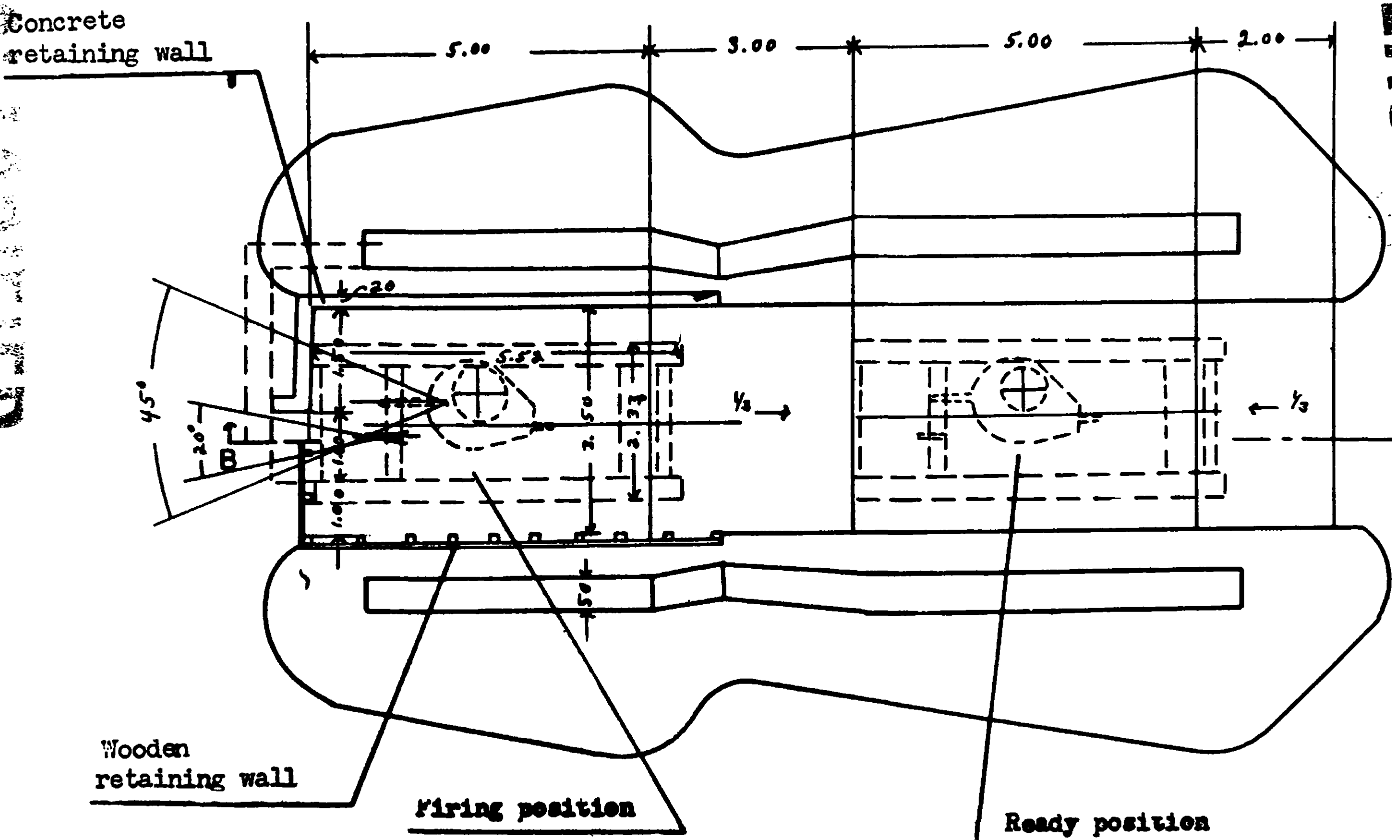


1. This diagram illustrates one type of earth revetment for medium tank (capable of climbing a 2/3 incline).
2. If necessary to do maintenance work on tank within revetment, increase the width and add the necessary facilities.
3. To facilitate turning and backing out in vicinity of revetment entrance, keep tank in position where it will be easy to run in or out.
4. In the event of the weakening of the revetment or of the ramp surface, reinforce accordingly.
5. Endeavor to facilitate drainage of rain water by installing drainage ditches, catch basins, and blind drains as circumstances warrant.
6. Conceal the upper part of the revetment with camouflage net, etc.
7. The amount of earth displaced in the types shown in this diagram is about 30 cu m each.

XII - REVETMENTS

FOR TANK - PARTIALLY REINFORCED

PLAN CROSS SECTION

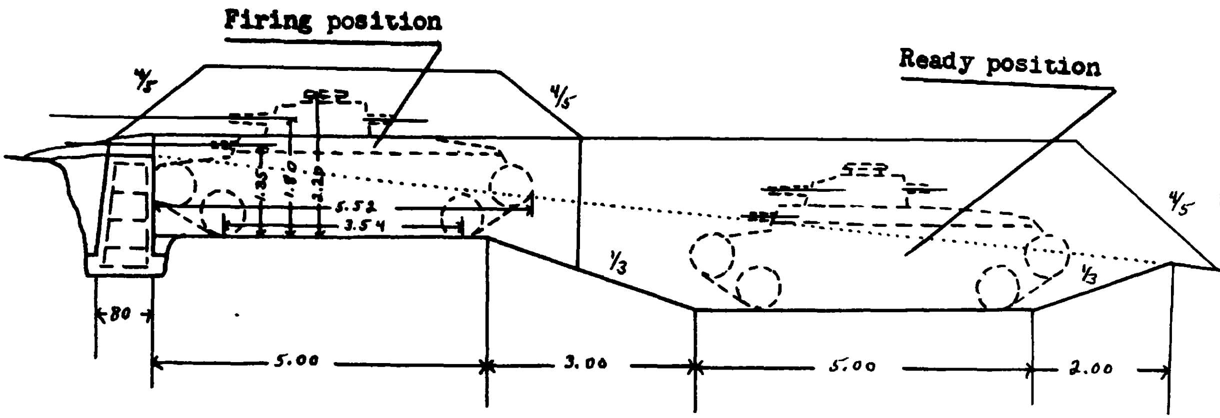


(TN: Wood or concrete reinforcement optional. Upper half of diagram is example of concrete construction; lower half shows wooden construction.)

XII - REVETMENTS

FOR TANK - PARTIALLY REINFORCED (Continued)

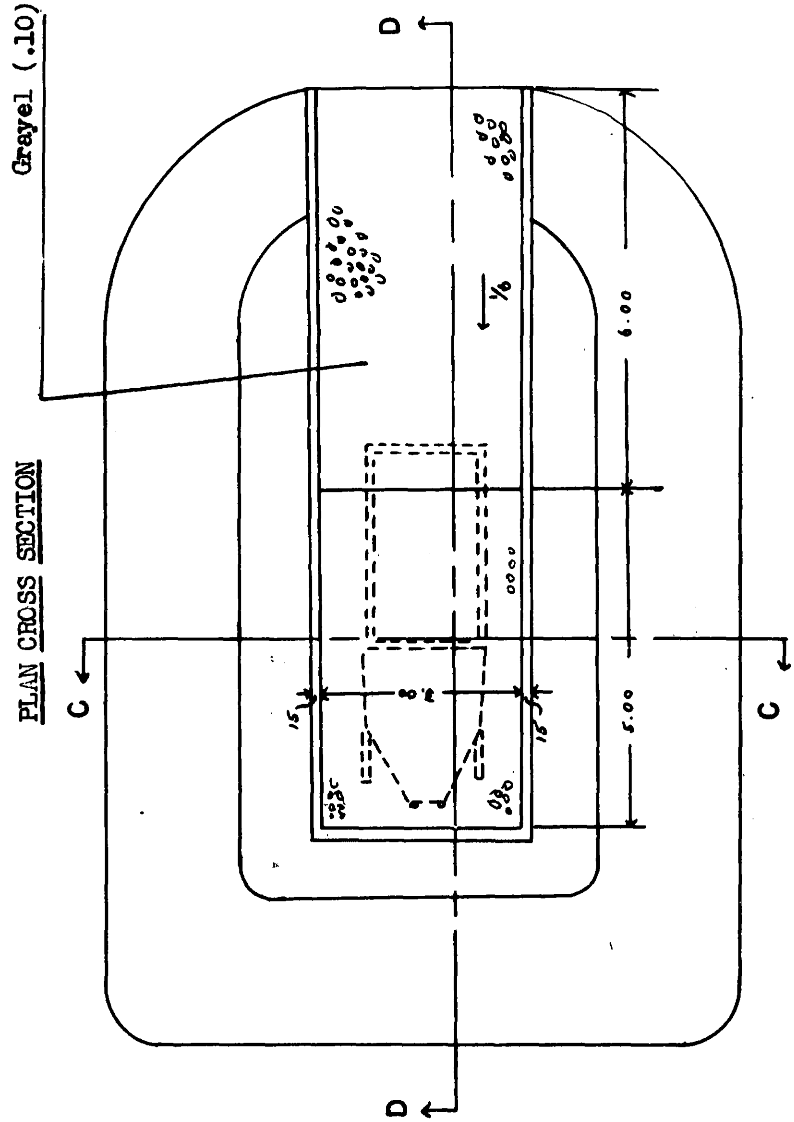
SECTION B-B



XII - REVETMENTS

FOR TANK/TRUCK

PLAN CROSS SECTION

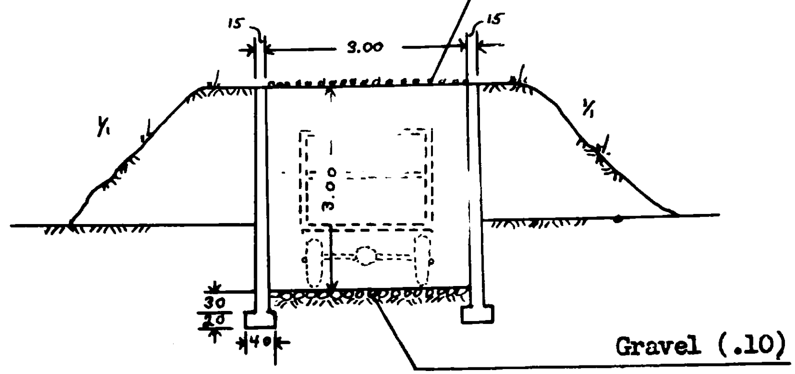


Reinforcing rods: 9mm dia., c-c .30

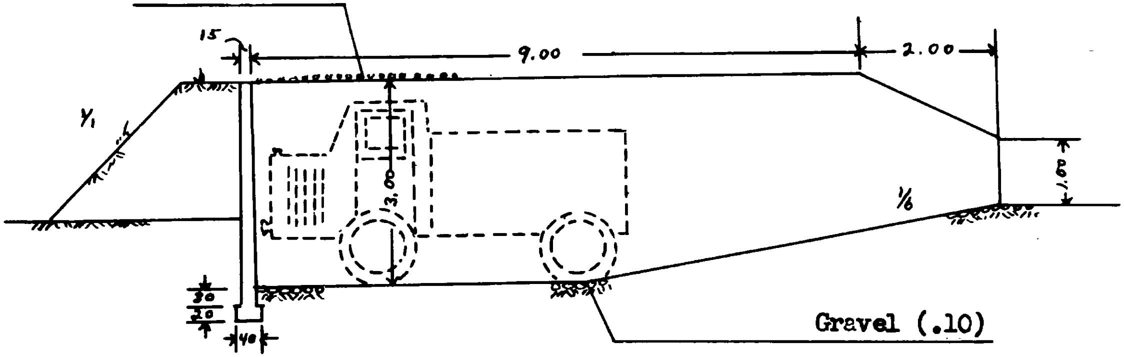
XII - REVETMENTS

FOR TANK/TRUCK (Continued)

SECTION C-C



SECTION D-D

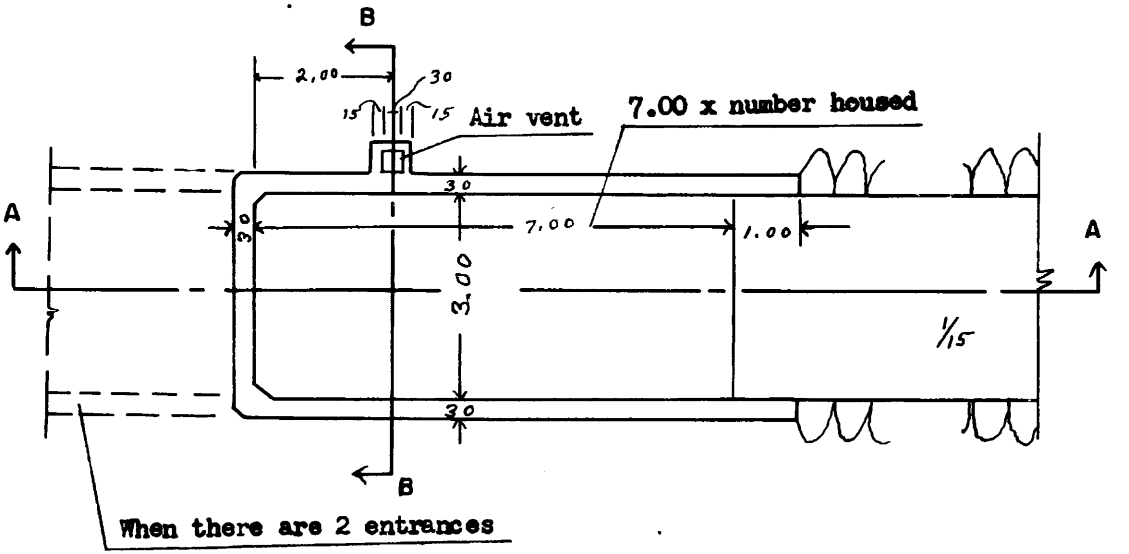


Reinforcing rods: 9mm dia., c-c .30

XII - REVETMENTS

FOR MEDIUM TANK/TRUCK - IN LEVEL GROUND

PLAN CROSS SECTION



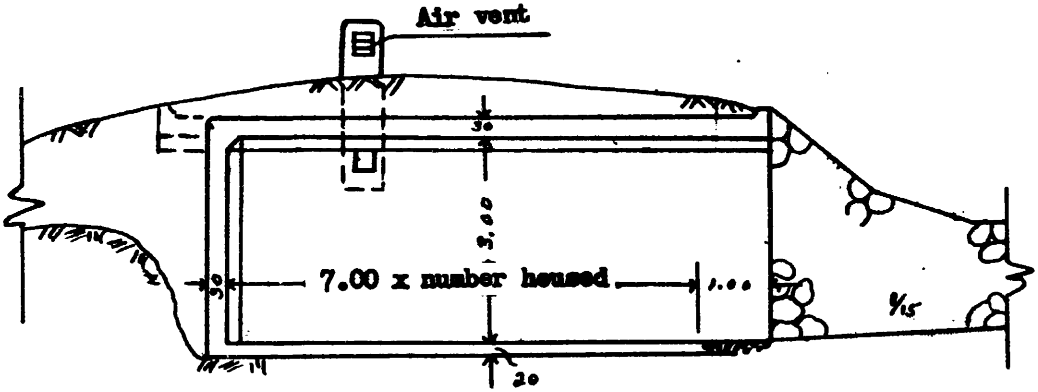
Reinforcing rods: 9mm dia., c-c .30

UNCLASSIFIED

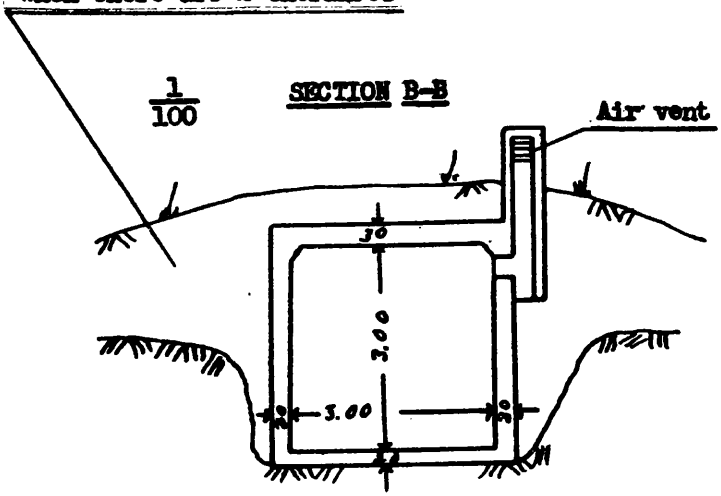
XII - REVETMENT

FOR MEDIUM TANK/TRUCK - IN LEVEL GROUND (Continued)

SECTION A-A



When there are 2 entrances

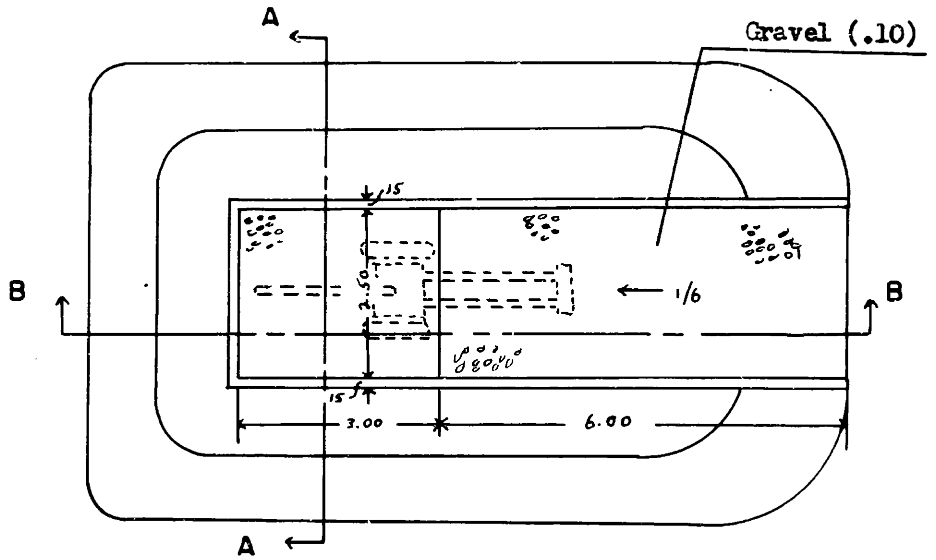


Reinforcing rods: 9mm dia., c-c .30

XII - REVETMENTS

FOR 47mm RAPID-FIRE GUN

PLAN CROSS SECTION

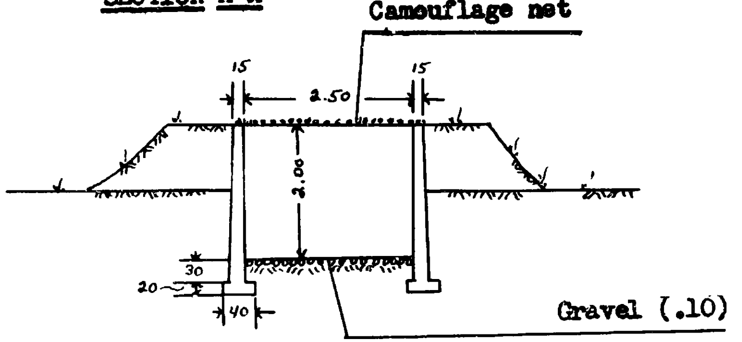


Reinforcing rods: 16mm dia., c-c .20

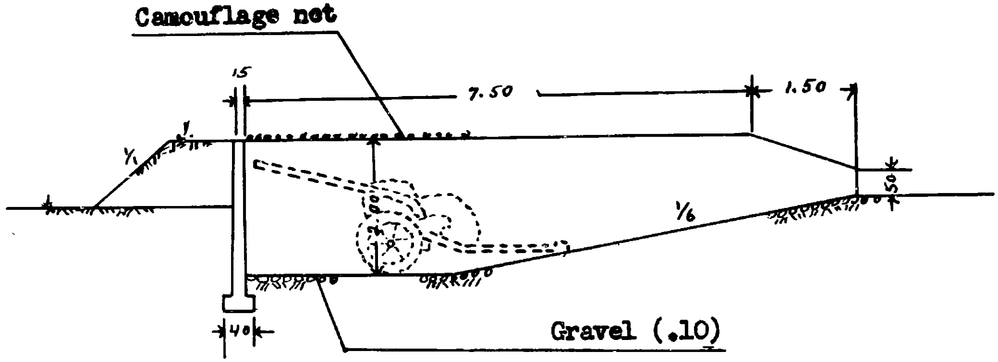
XII - REVETMENTS

FOR 47mm RAPID-FIRE GUN (Continued)

SECTION A-A

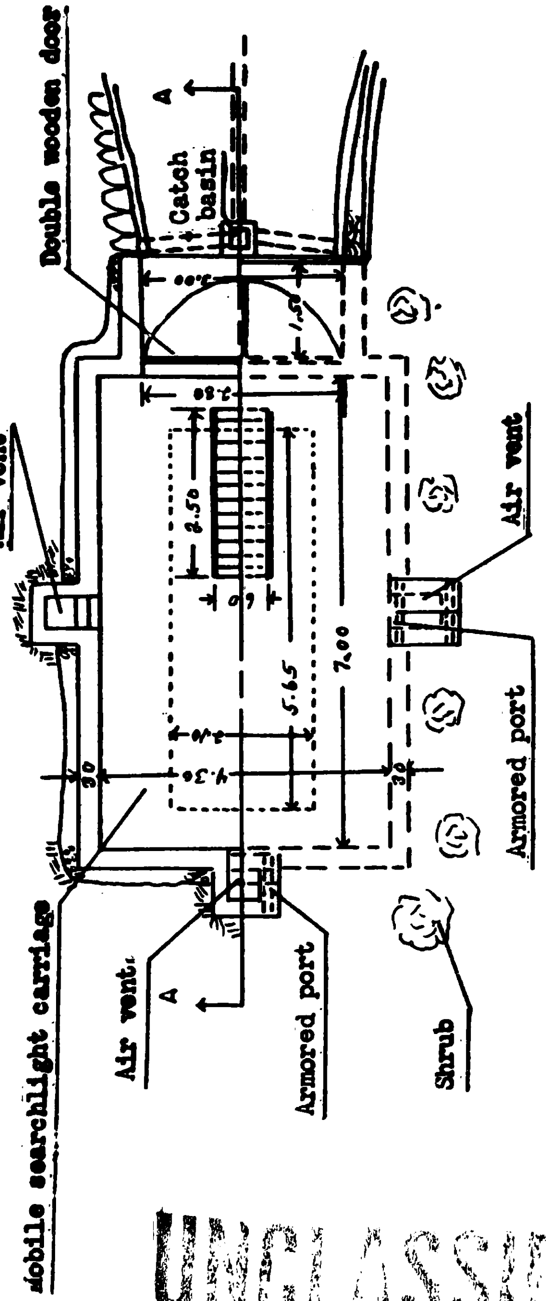


SECTION B-B



Reinforcing rods: 16mm dia., c-c .20

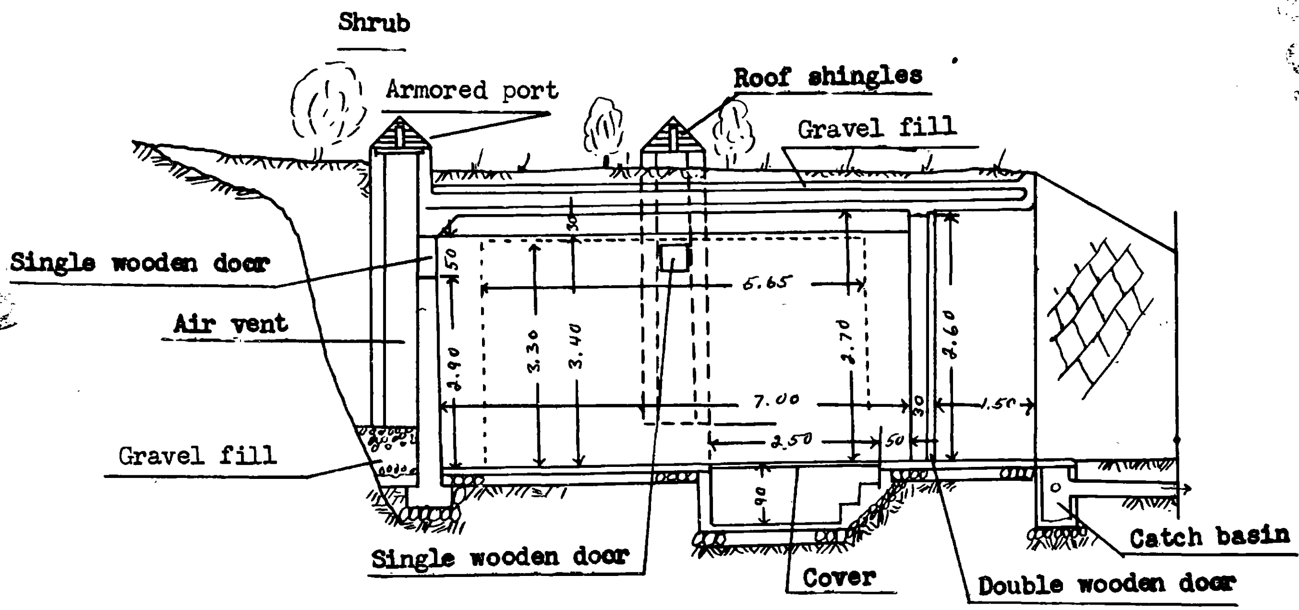
XIII - SEARCHLIGHT SHELTERS
/TYPE I/
PLAN CROSS SECTION



Reinforcing rods: 16mm dia., o-c .20

XIII - SEARCHLIGHT SHELTERS

/TYPE I (Continued)/
SECTION A-A

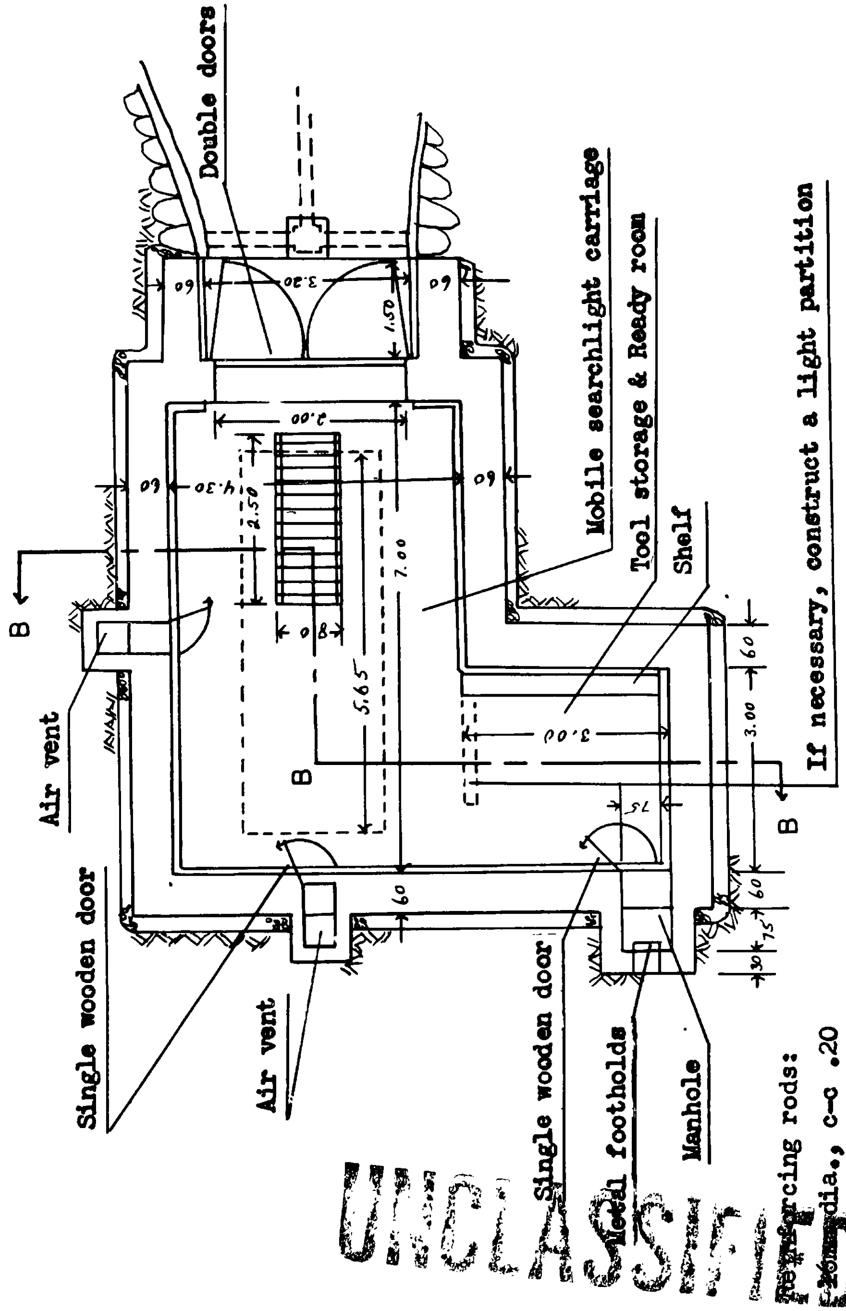


Reinforcing rods: 16mm dia., c-c .20

XIII - SEARCHLIGHT SHELTERS

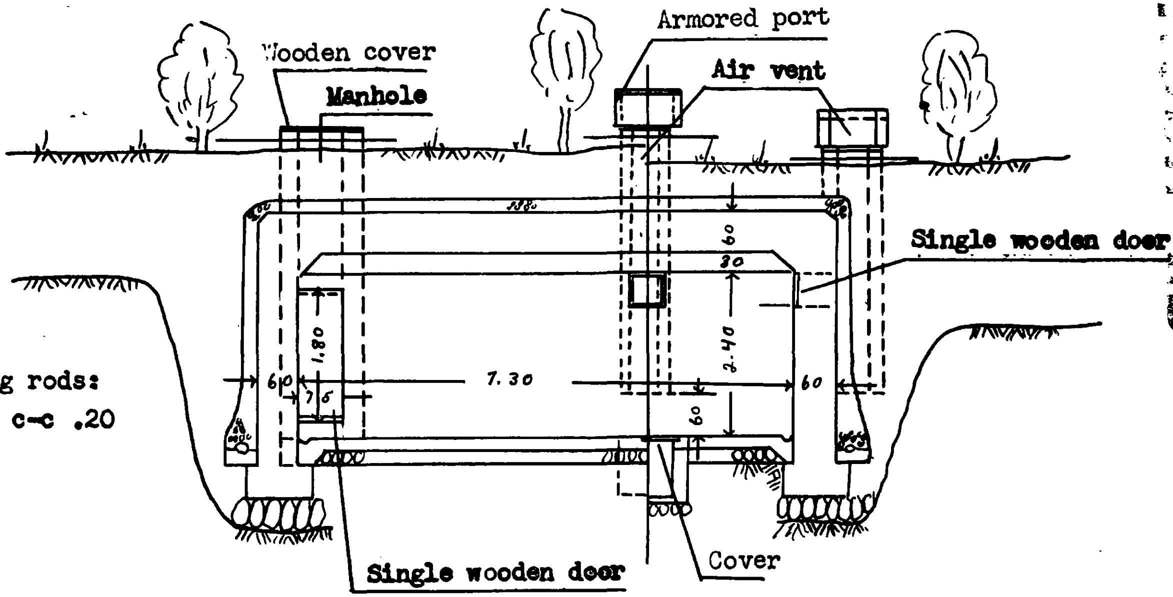
/TYPE II/

PLAN CROSS SECTION



XIII - SEARCHLIGHT SHELTERS

/TYPE II (Continued)/
SECTION B-B



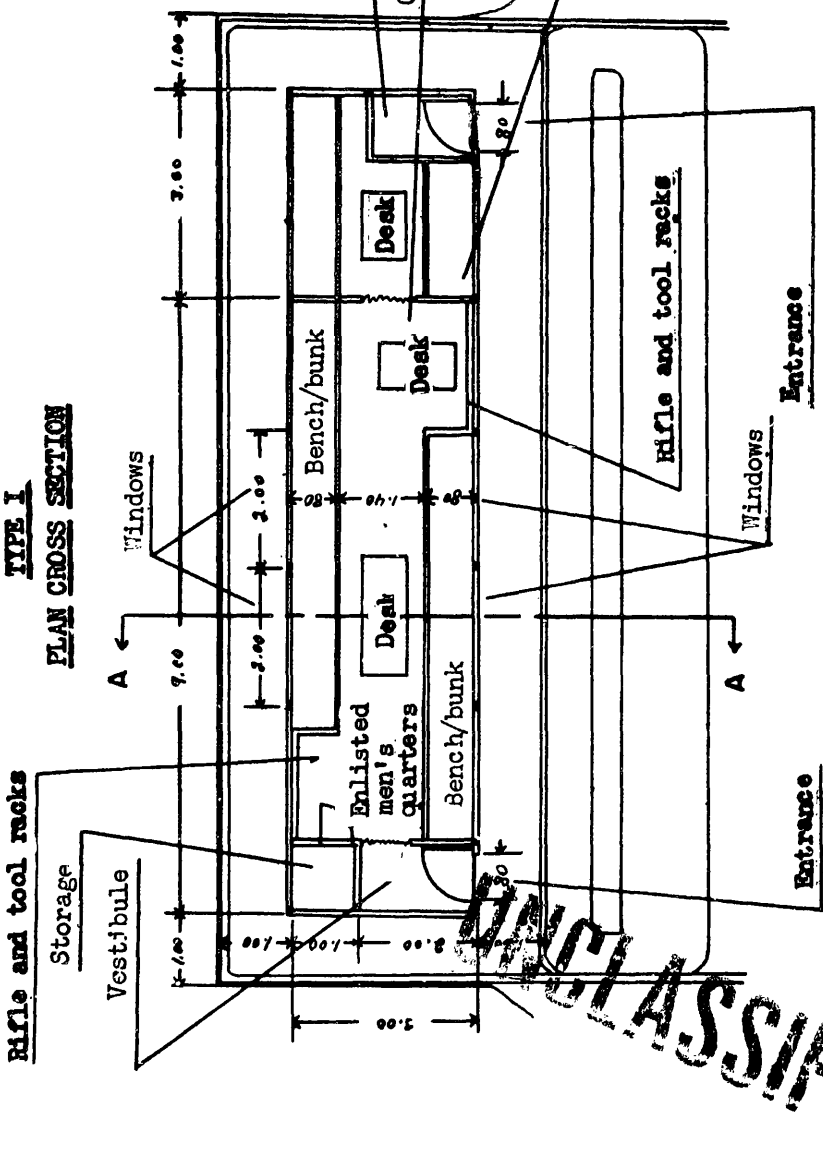
Reinforcing rods:
16mm dia., c-c .20

Note: Regardless of the disposition indicated in the diagram, the foundation is adapted to the terrain.

XIV - CUT-AND-COVER SHELTERS FOR PERSONNEL

TYPE I

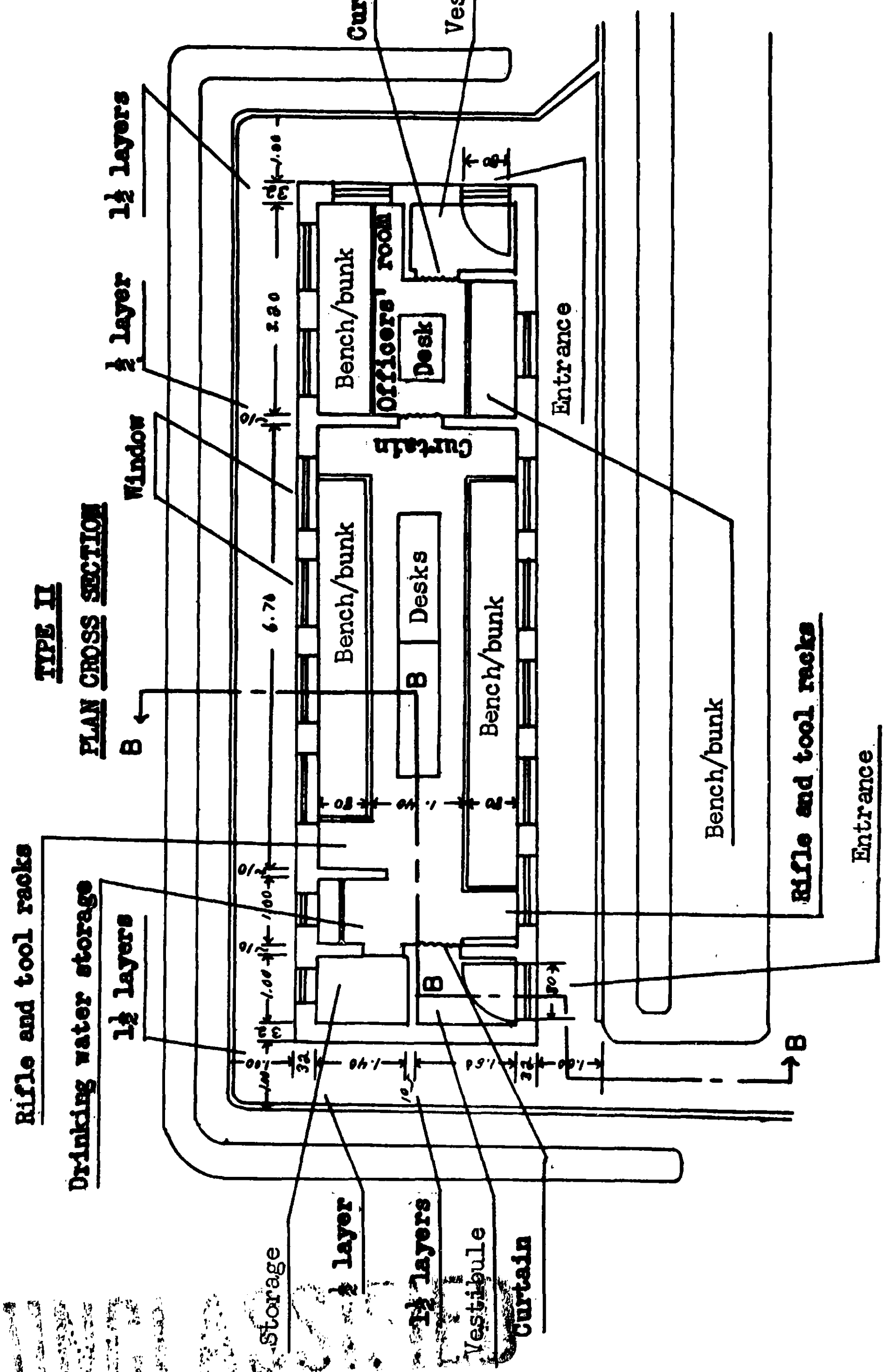
PLAN CROSS SECTION



XIV - CUT-AND-COVER SHELTERS FOR PERSONNEL

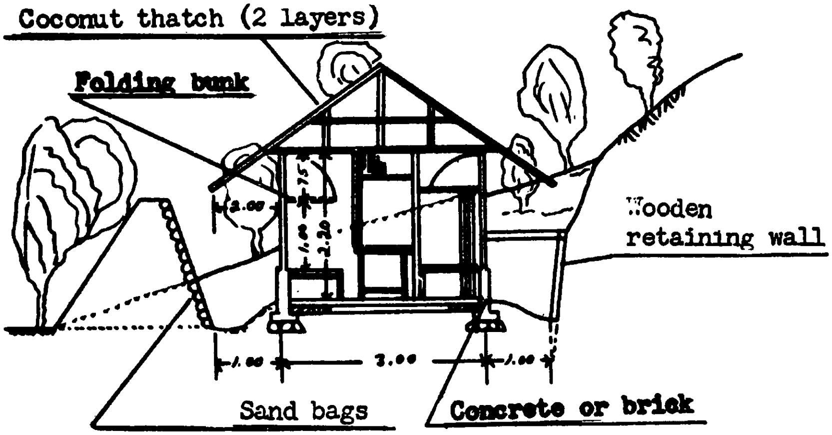
TYPE II

PLAN CROSS SECTION

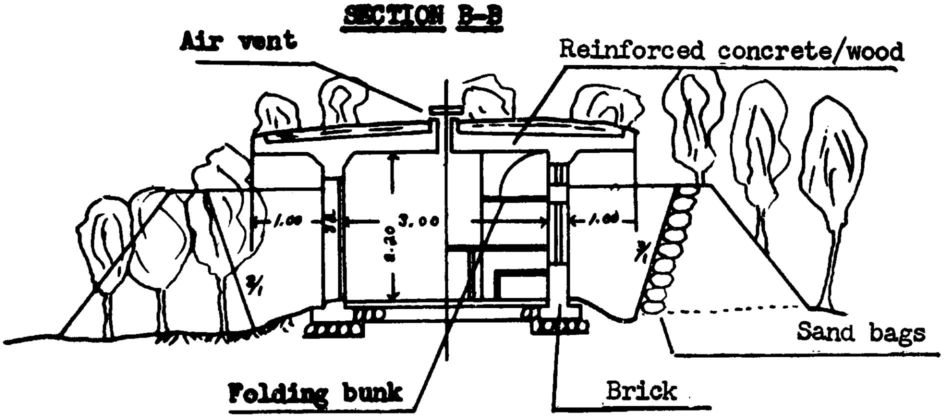


XIV - CUT-AND-COVER SHELTERS FOR PERSONNEL

SECTION A-A



SECTION B-B

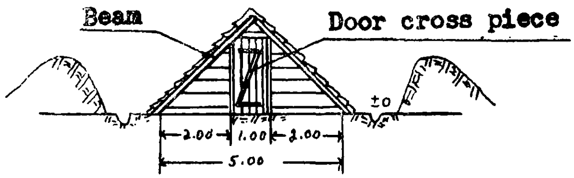


1. This diagram is an illustration of a shelter capable of holding about 20 men. Type I is built of wood and makes use of terrain features. Type II illustrates a brick structure on level ground.
2. The disposition of the foundation, drainage disposal, etc., is adapted to local terrain.

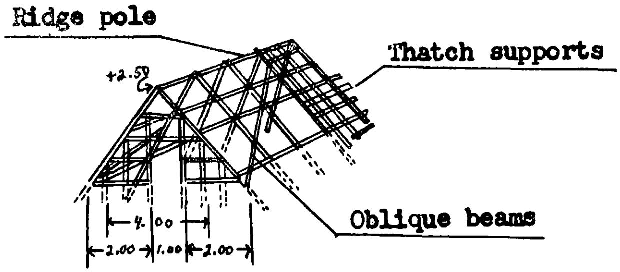
XIV - CUT-AND-COVER SHELTERS FOR PERSONNEL

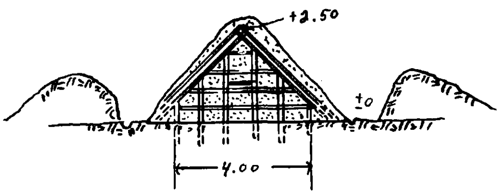
HASTY CONSTRUCTION

USING BEAMS AND SHINGLES FOR ROOF CONSTRUCTION



USING COCONUT THATCH AND ON-THE-SPOT MATERIALS





1. These diagrams illustrate examples of barracks construction. In order to simplify construction, (except in the case of barracks used in long halts) build them in triangular and entrenched types as explained.

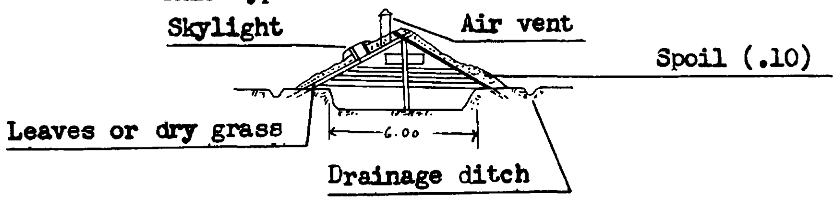
2. The size of the barracks ordinarily corresponds to the number of men accommodated. The length of the bunks is 2.00m, width 0.70m, and the passage 2.00m high and 1.00m wide.

XIV - CUT-AND-COVER SHELTERS FOR PERSONNEL

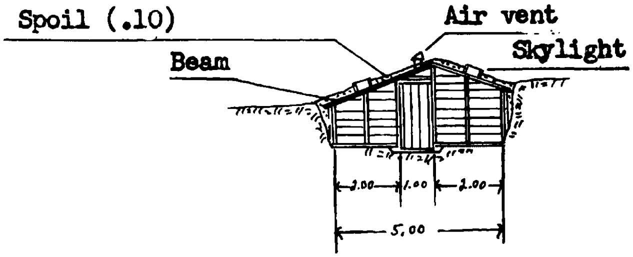
HASTY CONSTRUCTION (Continued)

EARTH COVER - TYPE I

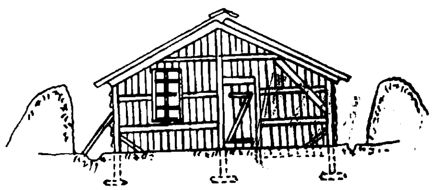
This type is suitable for dry ground



EARTH COVER - TYPE II



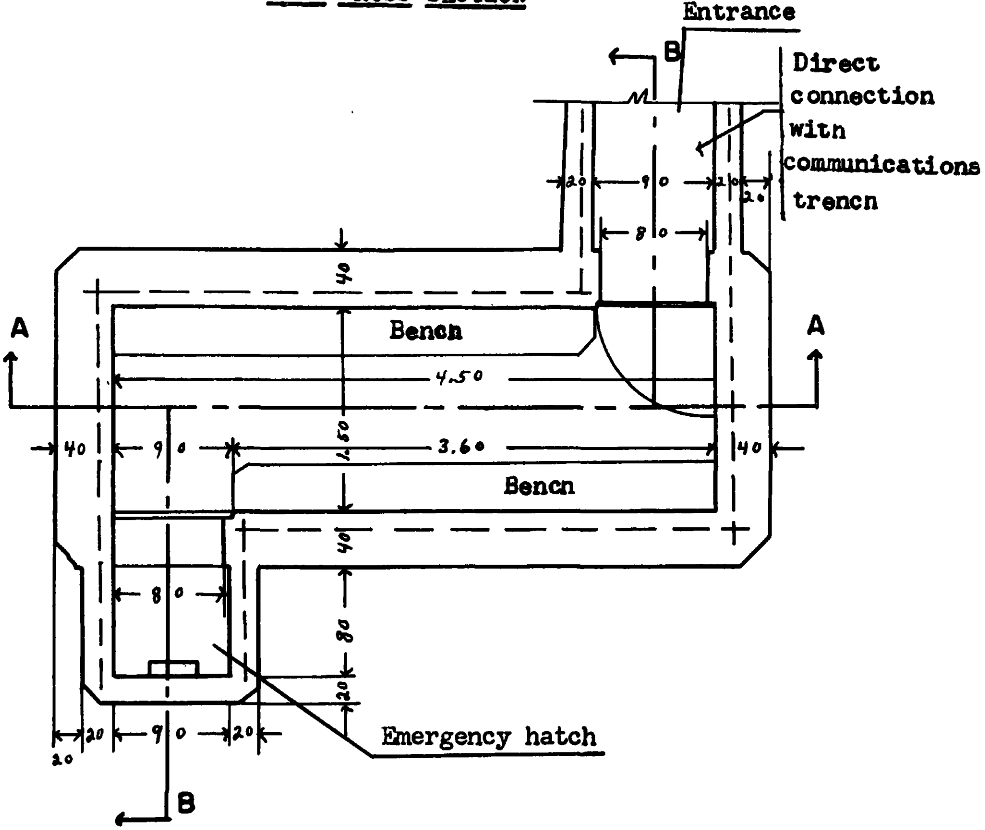
WOODEN - SEMI-ENTRENCHED



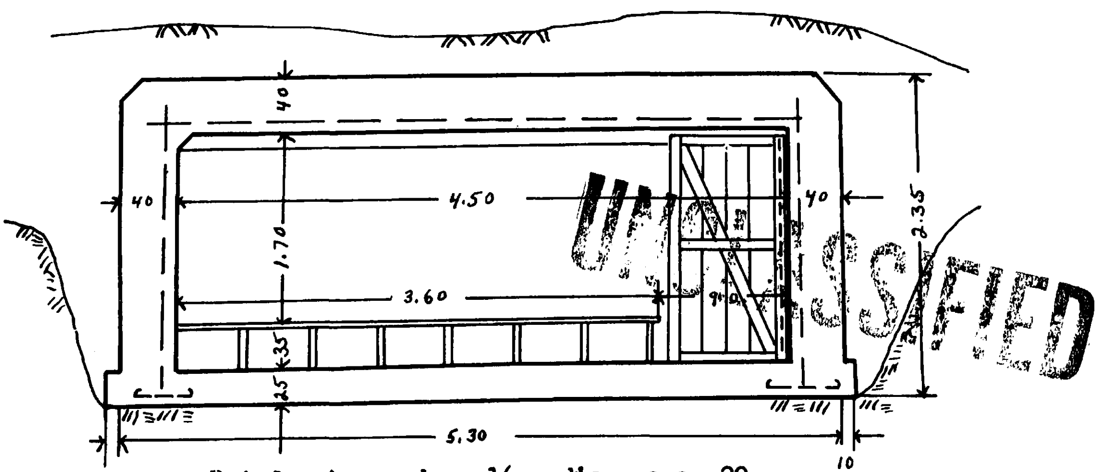
XV - UNDERGROUND SHELTERS FOR PERSONNEL

/TYPE I/

PLAN CROSS SECTION



SECTION A-A

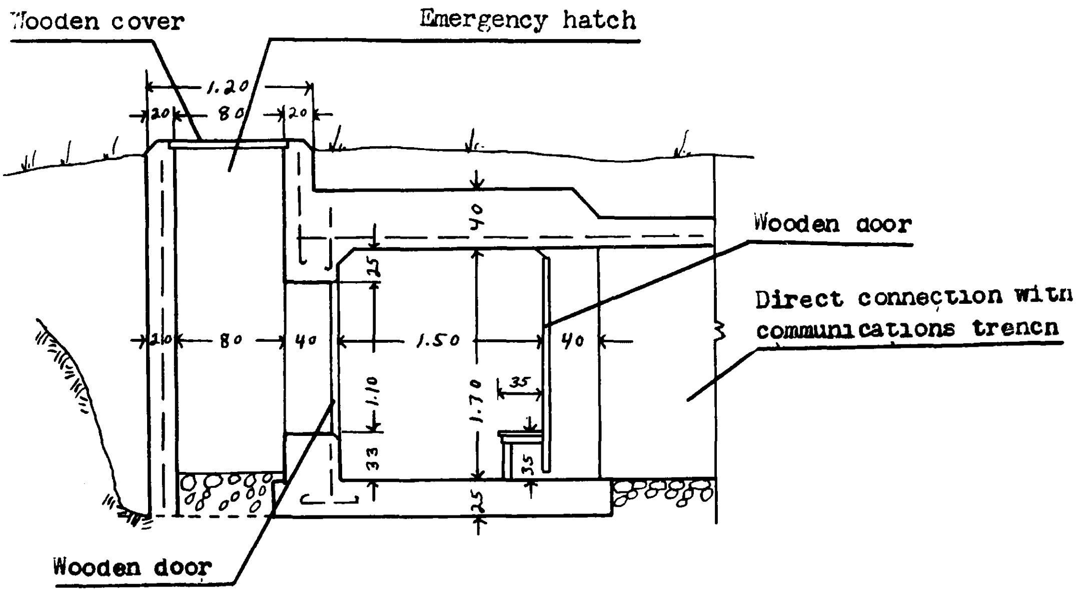


Reinforcing rods: 16mm dia., c-c .20

XV - UNDERGROUND SHELTERS FOR PERSONNEL

/TYPE I/ (Continued)

SECTION B-B

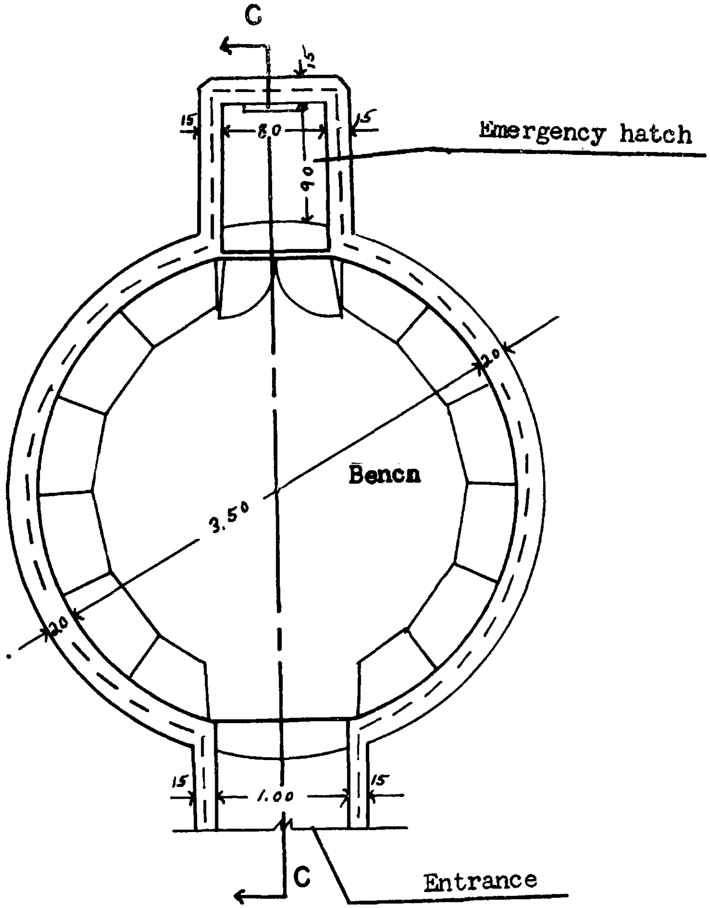


Reinforcing rods: 16mm dia., c-c .20

XV - UNDERGROUND SHELTERS FOR PERSONNEL

/TYPE II/

PLAN CROSS SECTION

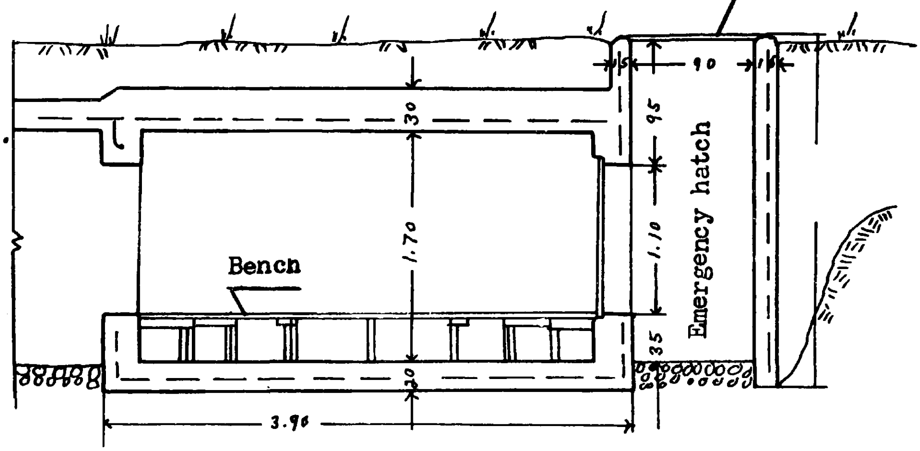


Reinforcing rods: 16mm dia., c-c .20

XV - UNDERGROUND SHELTERS FOR PERSONNEL

/TYPE II/ (Continued)

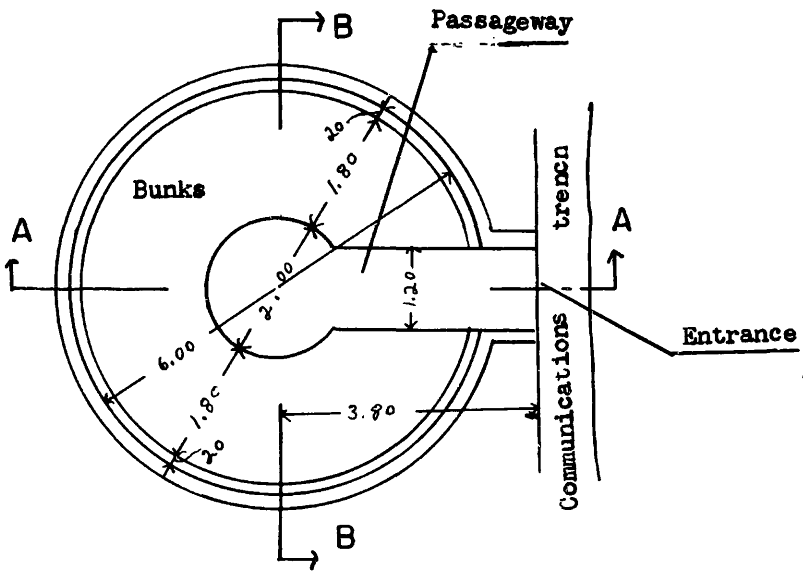
SECTION C-C



Reinforcing rods: 16mm dia., c-c .20

XV - UNDERGROUND SHELTERS FOR PERSONNEL

TURTLEBACK-SHAPED, FRAMELESS - HOUSING 20 MEN
PLAN CROSS SECTION



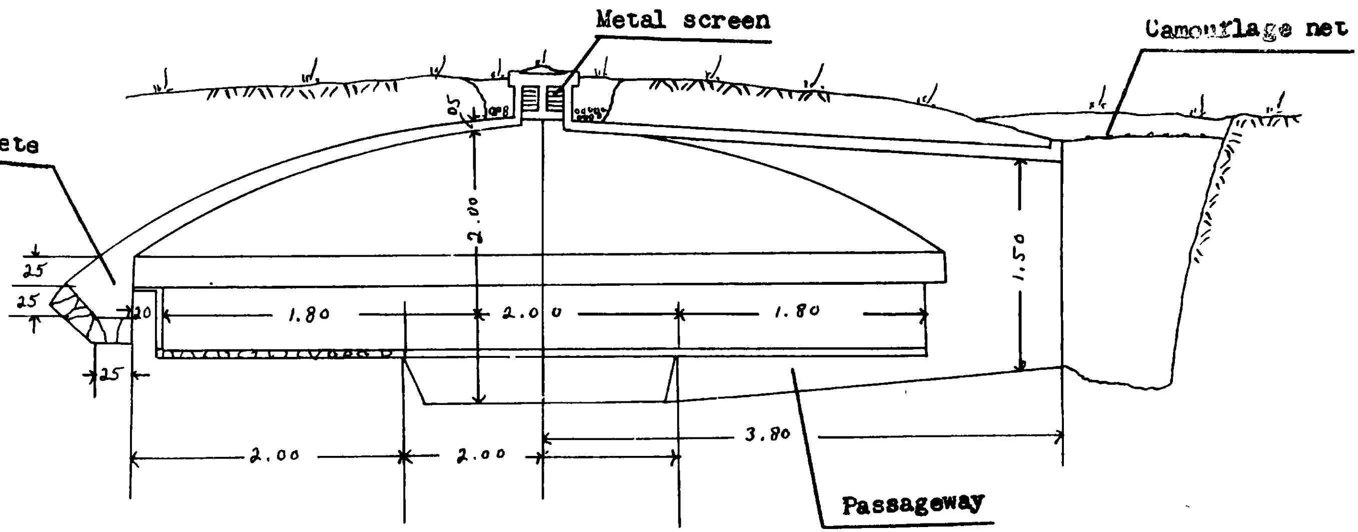
(TN: Notes on original document are illegible.)

List of Required Materials

Material	Quantity
Concrete (ratio 1:2:4)	3.5 cu m
Concrete (ratio 1:4:8)	3.0 cu m
Mortar (ratio 1:3)	0.5 cu m
Broken stone	3.0 cu m
Straw	400 kg
Cement	40 bags
Sand	3.6 cu m
Gravel	6 cu m

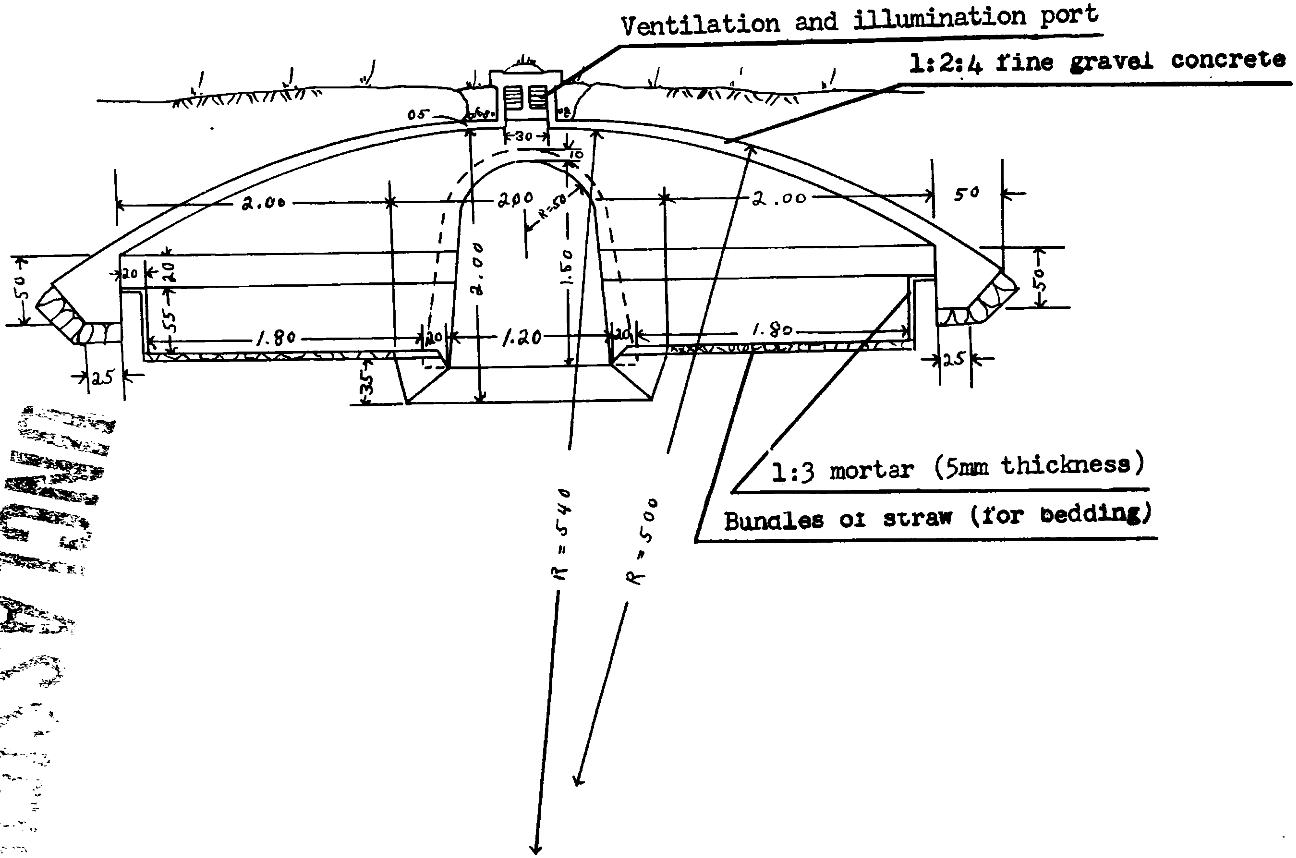
XV - UNDERGROUND SHELTERS FOR PERSONNEL

TURTLEBACK-SHAPED, FRAMELESS - HOUSING 20 MEN (Continued)
SECTION A-A



XV - UNDERGROUND SHELTERS FOR PERSONNEL

TURTLEBACK-SHAPED, FRAMELESS - HOUSING 20 MEN (Continued)
SECTION B-B

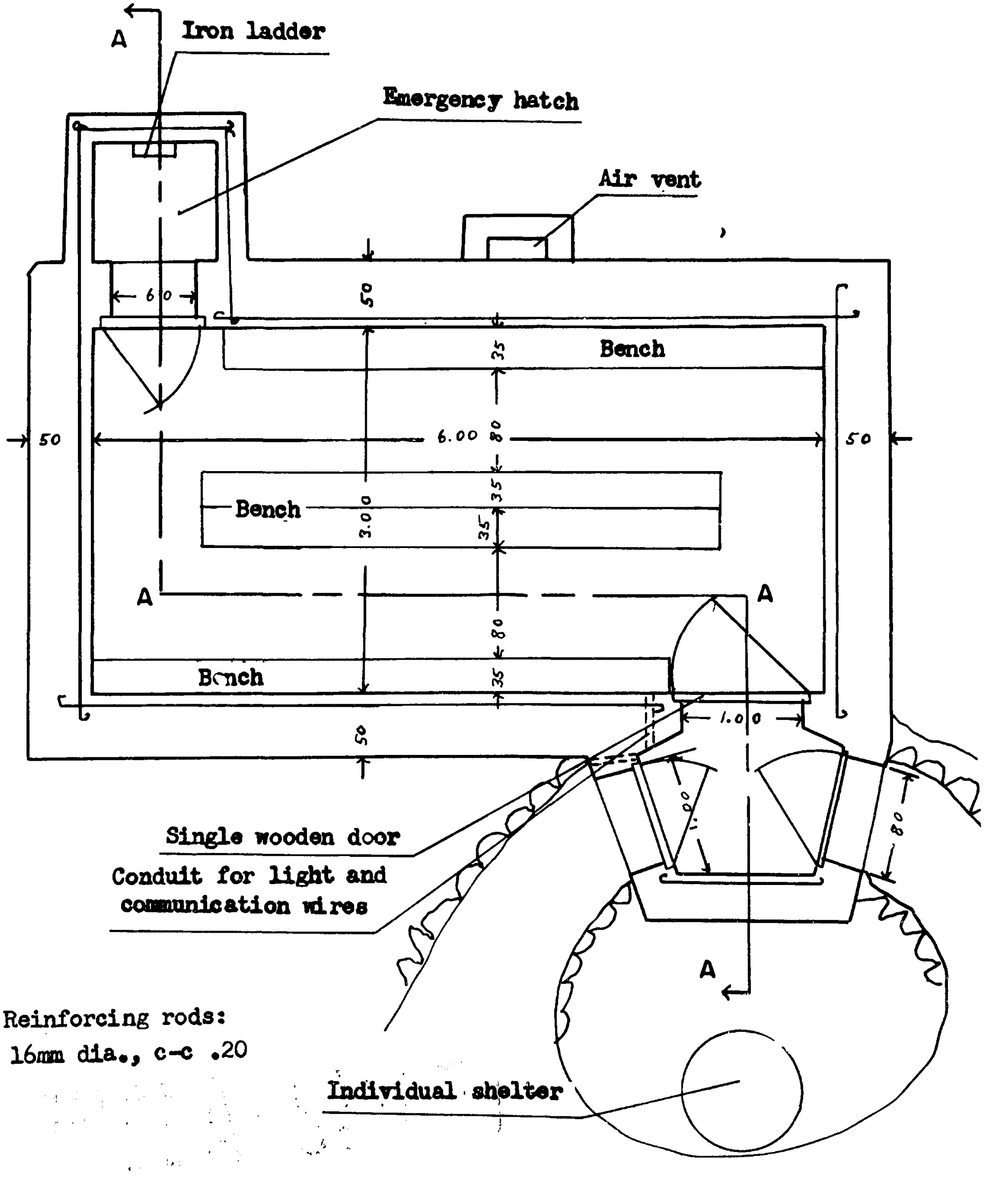


XV - UNDERGROUND SHELTERS FOR PERSONNEL

HOUSING 30 MEN

(Amount of concrete: about 52 cu m)

PLAN CROSS SECTION

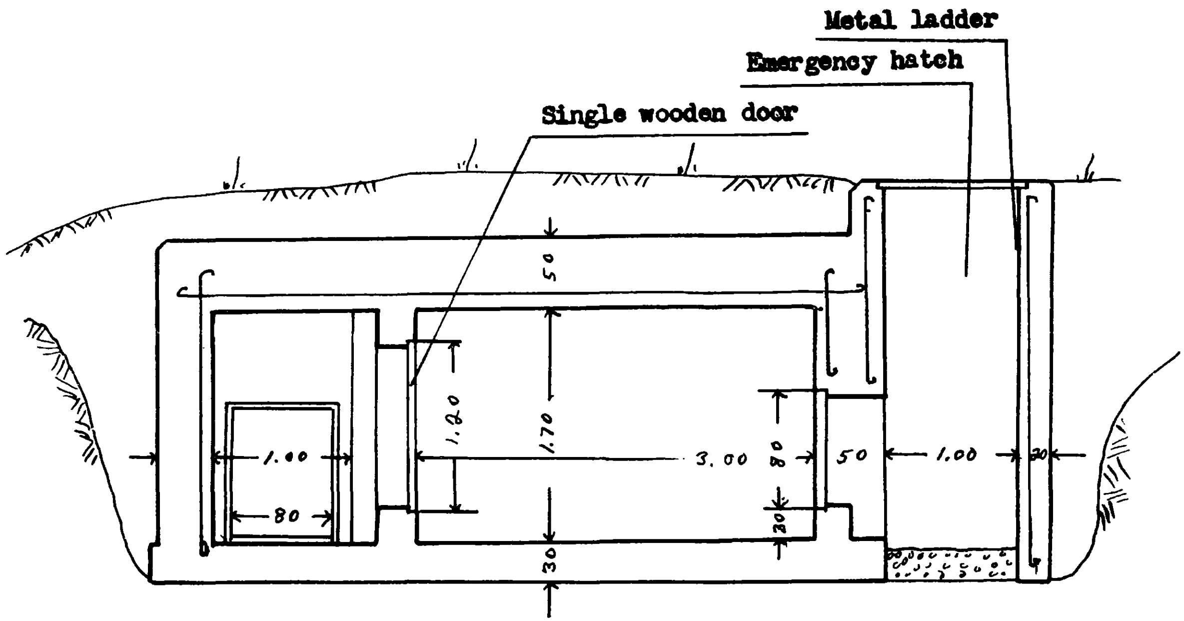


Reinforcing rods:
16mm dia., c-c .20

XV - UNDERGROUND SHELTERS FOR PERSONNEL

HOUSING 30 MEN (Continued)

SECTION A-A



Reinforcing rods: 16mm dia., c-c .20

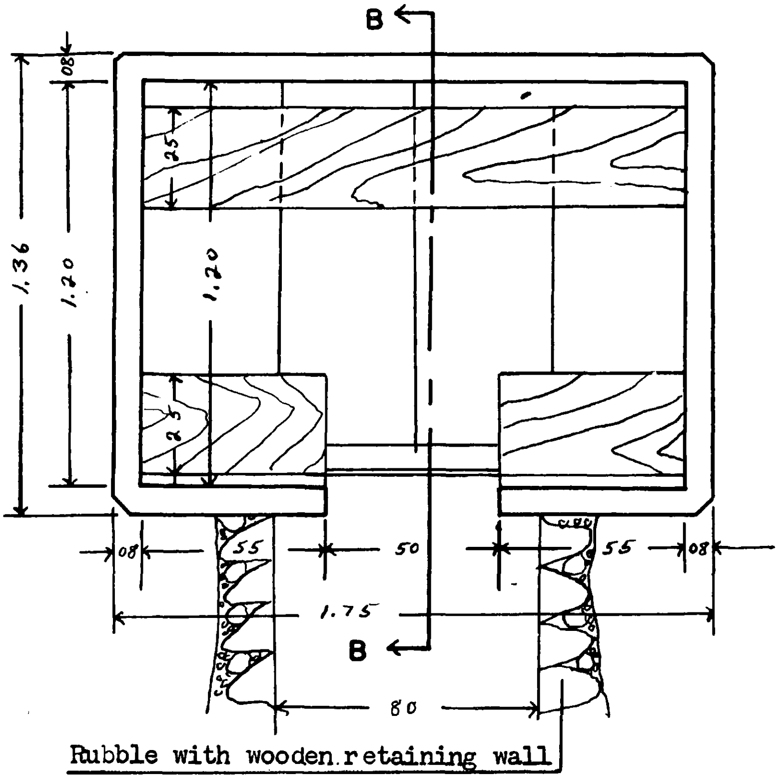
UNCLASSIFIED

XV - UNDERGROUND SHELTERS FOR PERSONNEL

HOUSING 6 MEN

(Amount of concrete: about 0.2 cu m)

PLAN CROSS SECTION

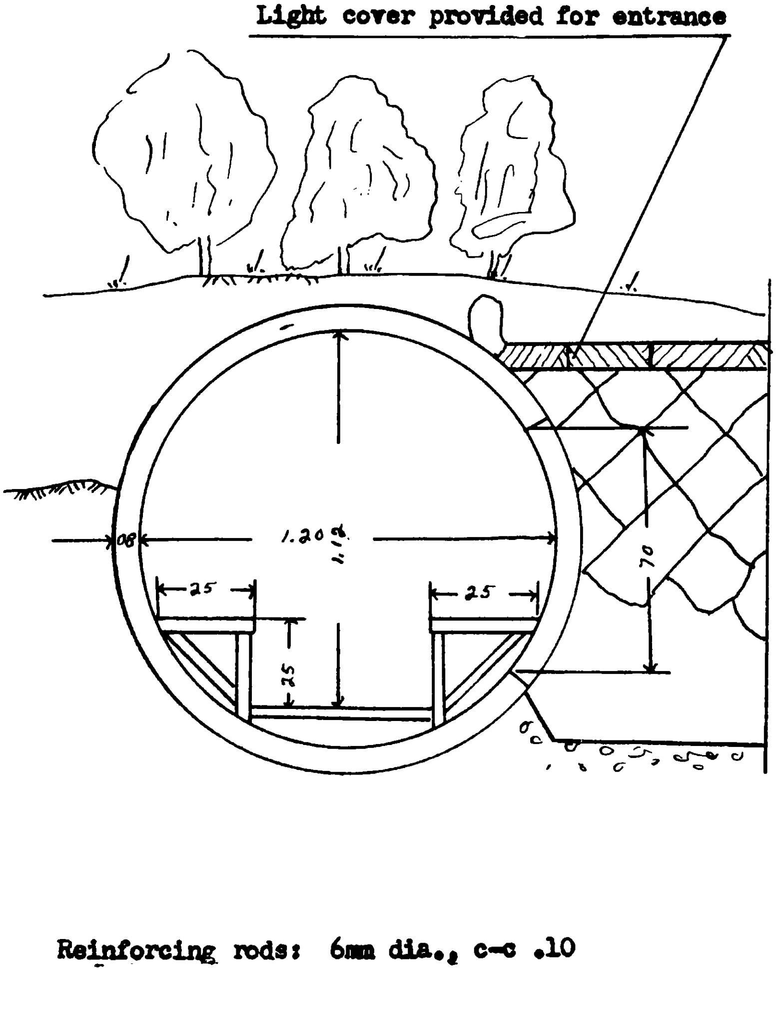


Reinforcing rods: 6mm dia., c-c .10

XV - UNDERGROUND SHELTERS FOR PERSONNEL

HOUSING 6 MEN (Continued)

SECTION B-B



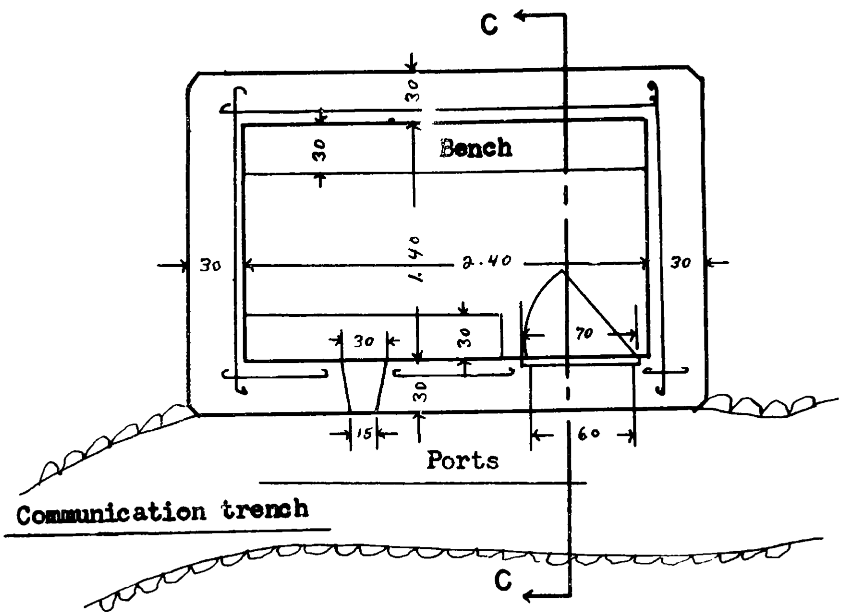
Reinforcing rods: 6mm dia., c-c .10

XV - UNDERGROUND SHELTERS FOR PERSONNEL

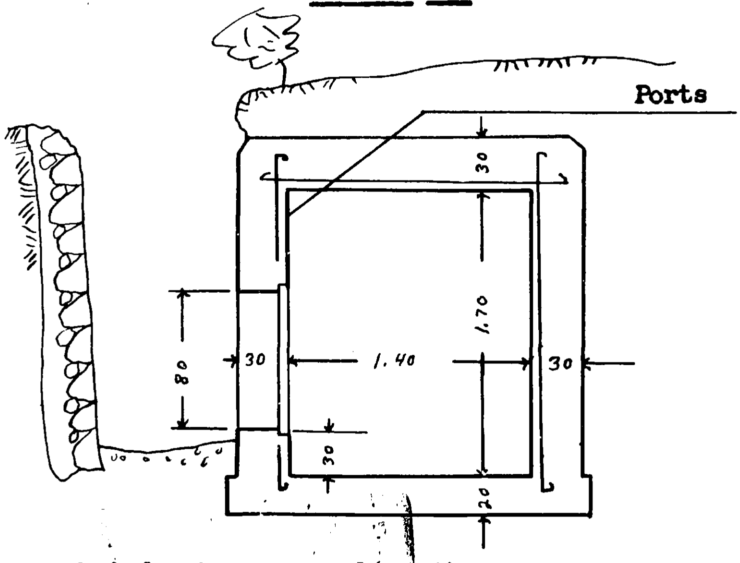
HOUSING 8 MEN

(Amount of concrete: about 8 cu m)

PLAN CROSS SECTION



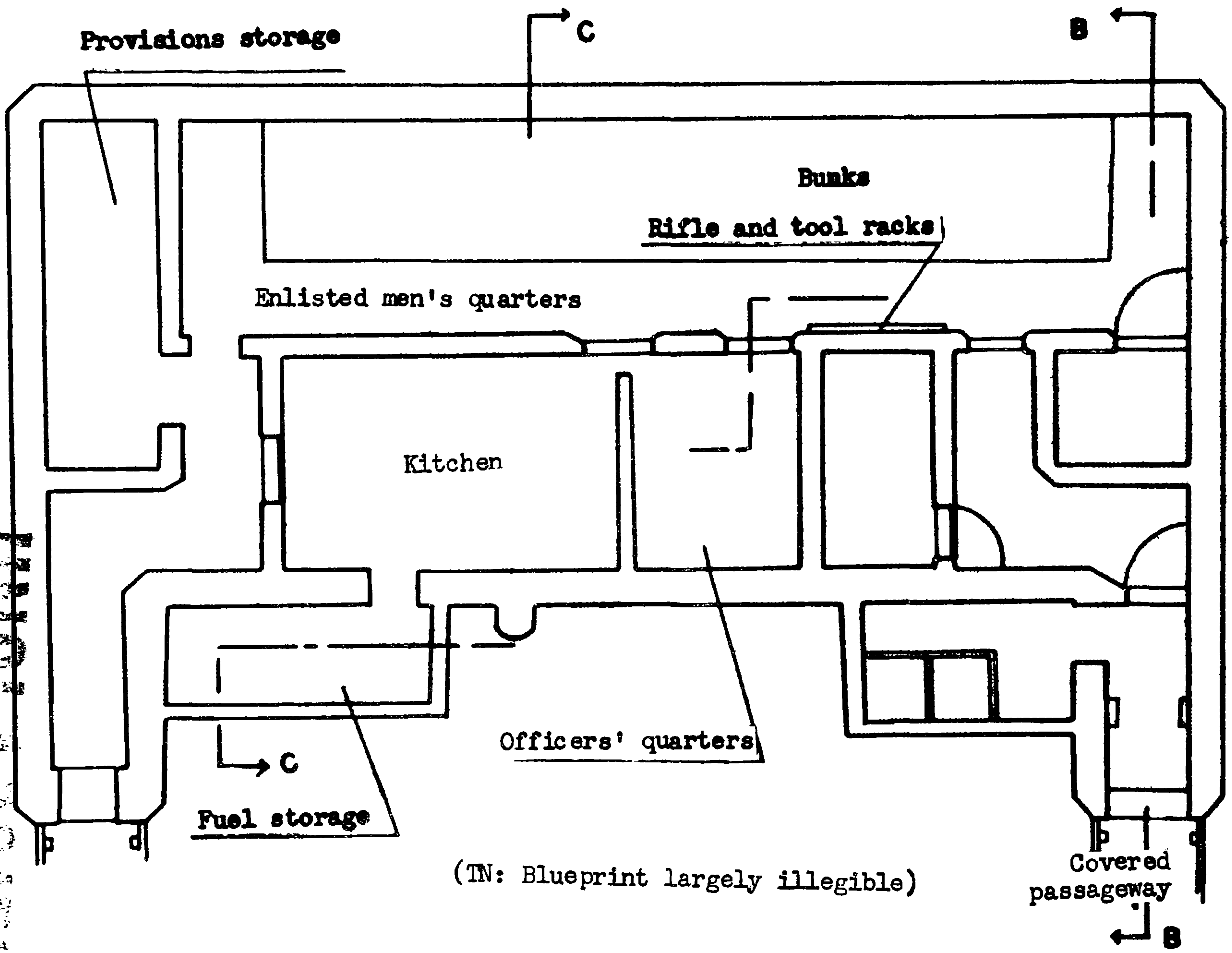
SECTION C-C



Reinforcing rods: 16mm dia., c-c .20

XV - UNDERGROUND SHELTERS FOR PERSONNEL

LIVING QUARTERS
PLAN CROSS SECTION

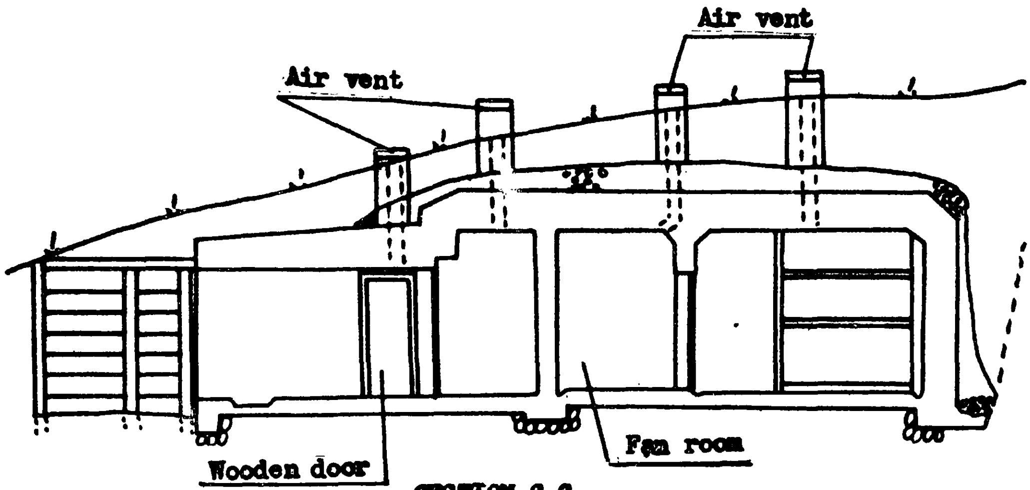


(TN: Blueprint largely illegible)

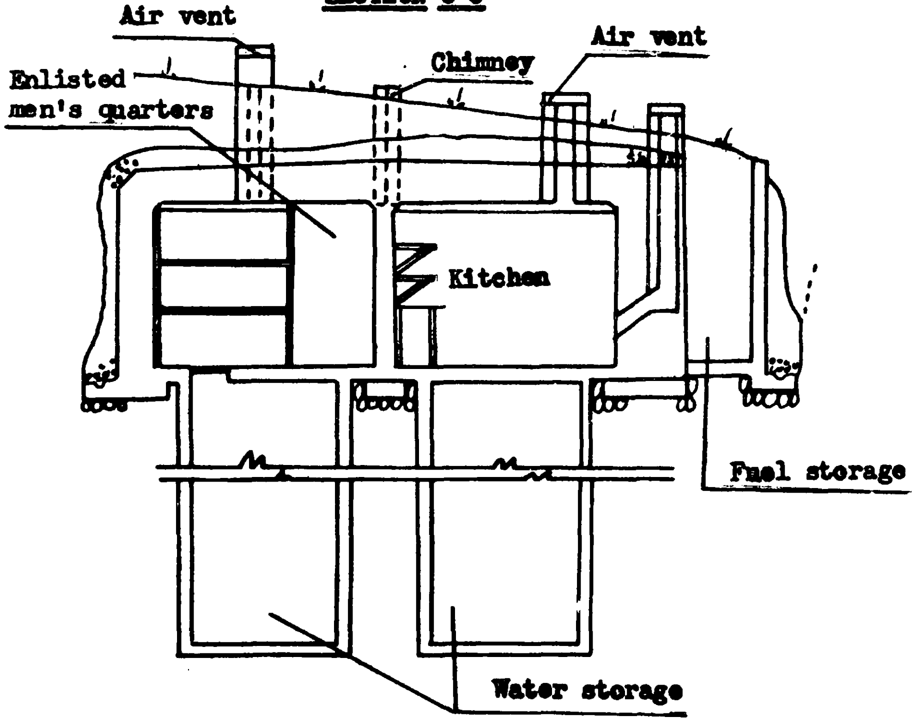
XV - UNDERGROUND SHELTERS FOR PERSONNEL

LIVING QUARTERS (Continued)

SECTION B-B



SECTION C-C



(TN: Blueprint largely illegible)

XV - UNDERGROUND SHELTERS FOR PERSONNEL

LIVING QUARTERS (Continued)

List of Required Materials

Concrete	253 cu m
Reinforced Concrete	10.5 tons
Forms, inner	505 sq m
Forms, outer	310 sq m
Broken Stone	80 cu m

Accessories

Steel doors, entrance	5
Wooden doors, entrance	8
Gas curtains	2
(TN:?) covers	4
Bunks	57
Rifle & tool racks	7
Desks	2
Chairs	3
Kitchen work table	1
Table	1
Water tub	1
(TN:?)	1
(TN:?)	1
Shelves	1
(TN:?)	1
(TN:?)	1
Intake	?
Exhaust	5
Drainage unit	1
Miscellaneous	

Notes:

1. This diagram illustrates an underground shelter for personnel. This shelter provides kitchen facilities, provisions storage (200 persons, 1 (TN:?) month), magazine, and bunks for 3 officers and 43 (TN:?) men.

2. Disposition of foundation, drainage and entrances should take into account factors of local terrain and soil.

3. Water storage may be omitted where there is no shortage of fresh water.

4. Bunks above water storage removable. Water drawn through manhole by rope and bucket. Rope ladder to be provided.

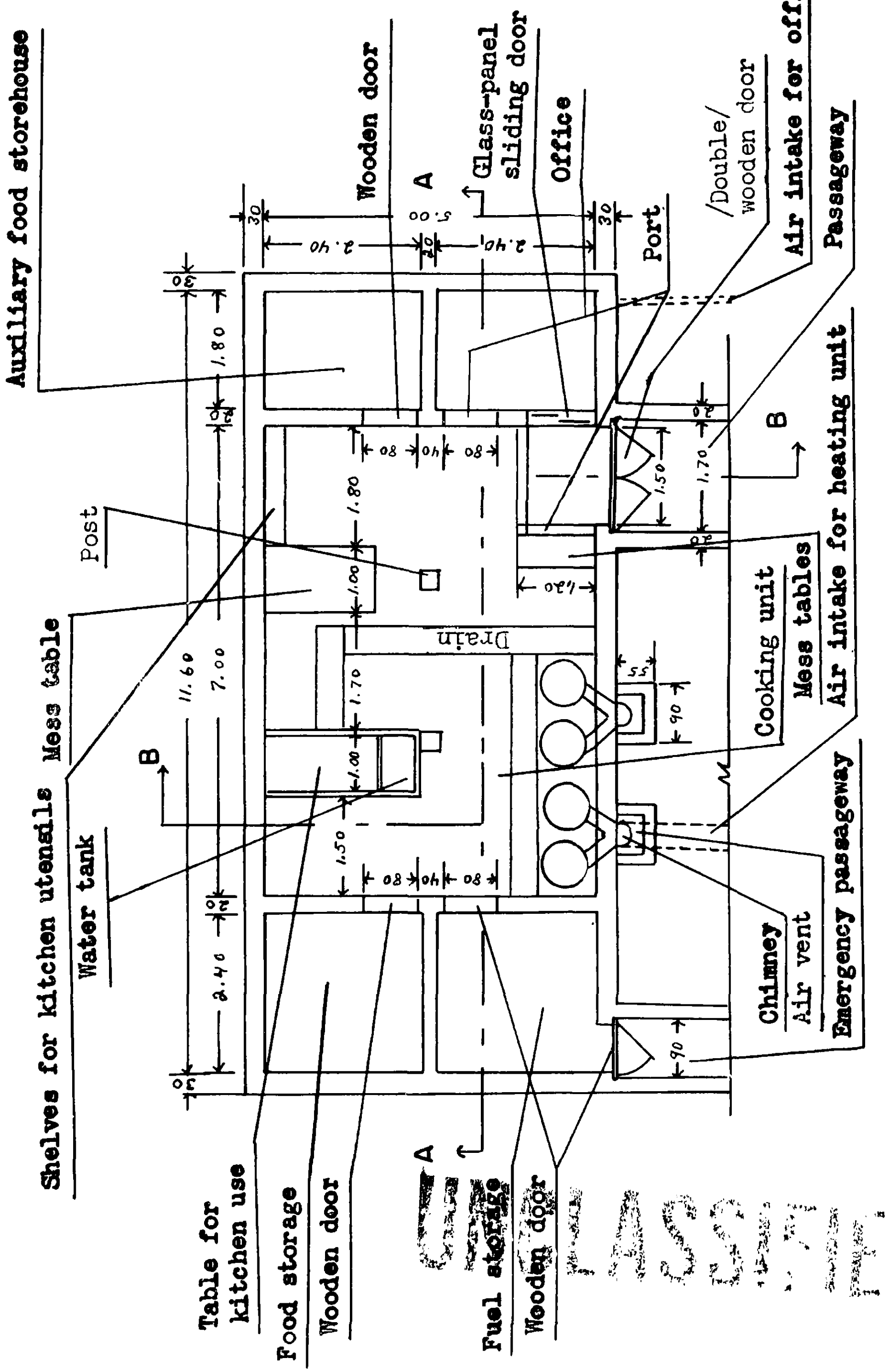
5. Provide overflow drain for water storage.

6. If water from covered drains is pure and suitable for cooking, pipe to water storage.

XVI - /UNDERGROUND/ FIELD KITCHEN

/TYPE I/

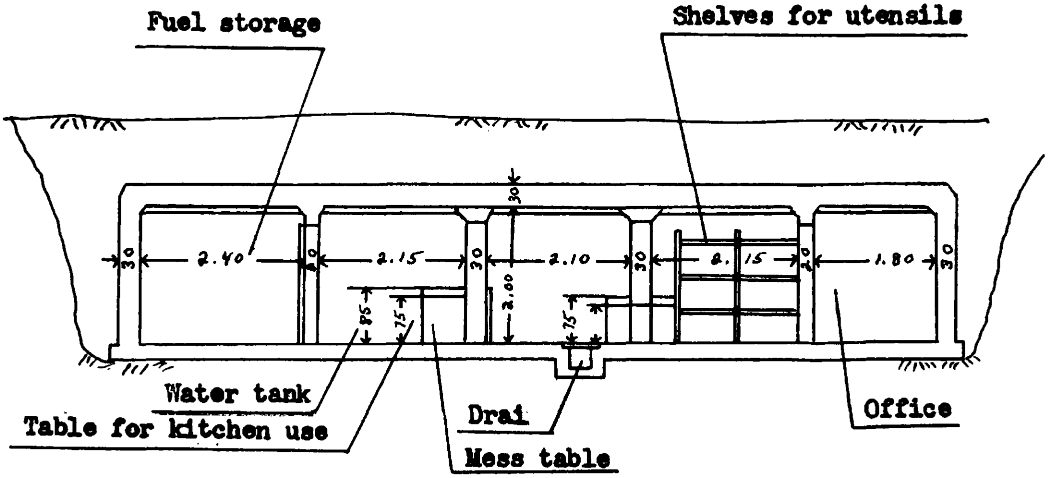
PLAN CROSS SECTION



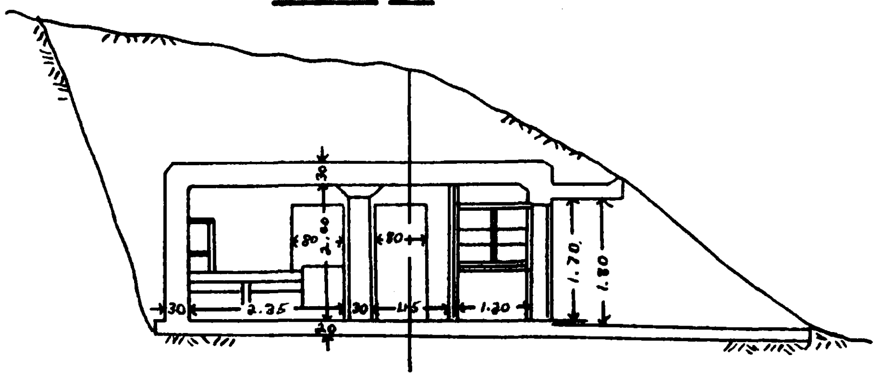
XVI - /UNDERGROUND/ FIELD KITCHEN

/TYPE I/ (Continued)

SECTION A-A

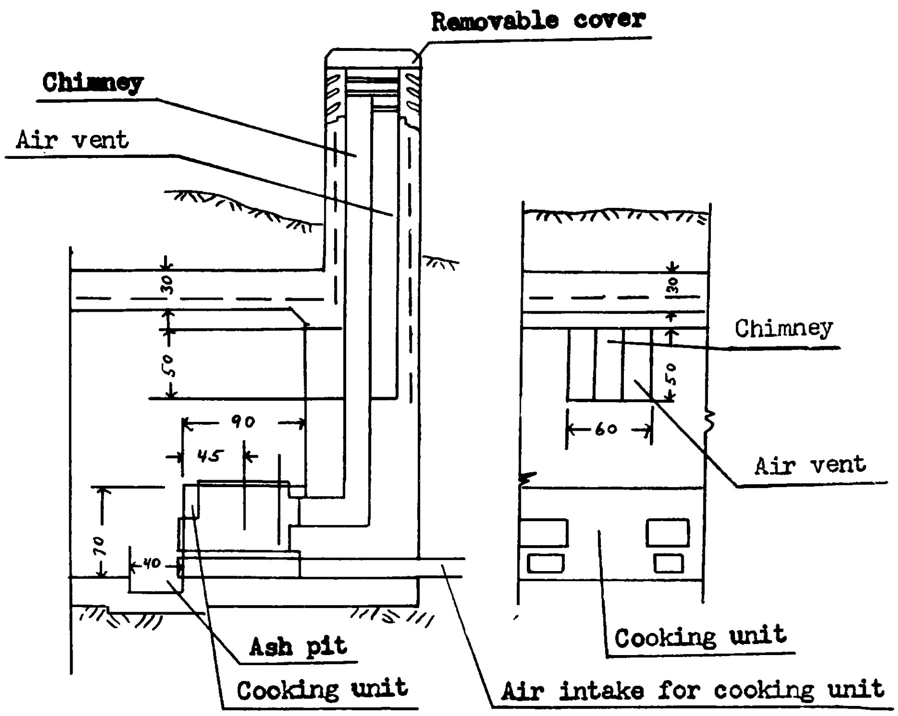


SECTION B-B



XVI - /UNDERGROUND/ FIELD KITCHEN

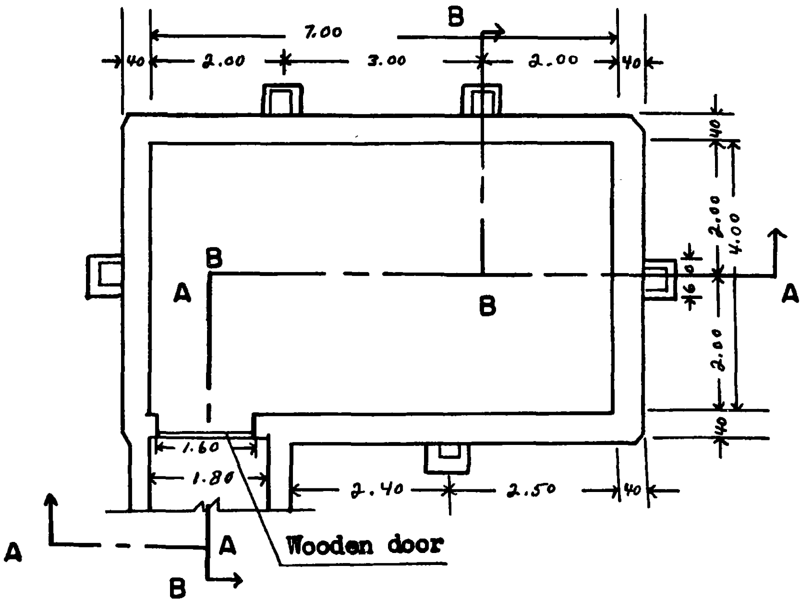
DETAIL OF HEATING UNIT AND AIR VENT



XVII - PROVISIONS STOREHOUSES

/TYPE I/

PLAN CROSS SECTION

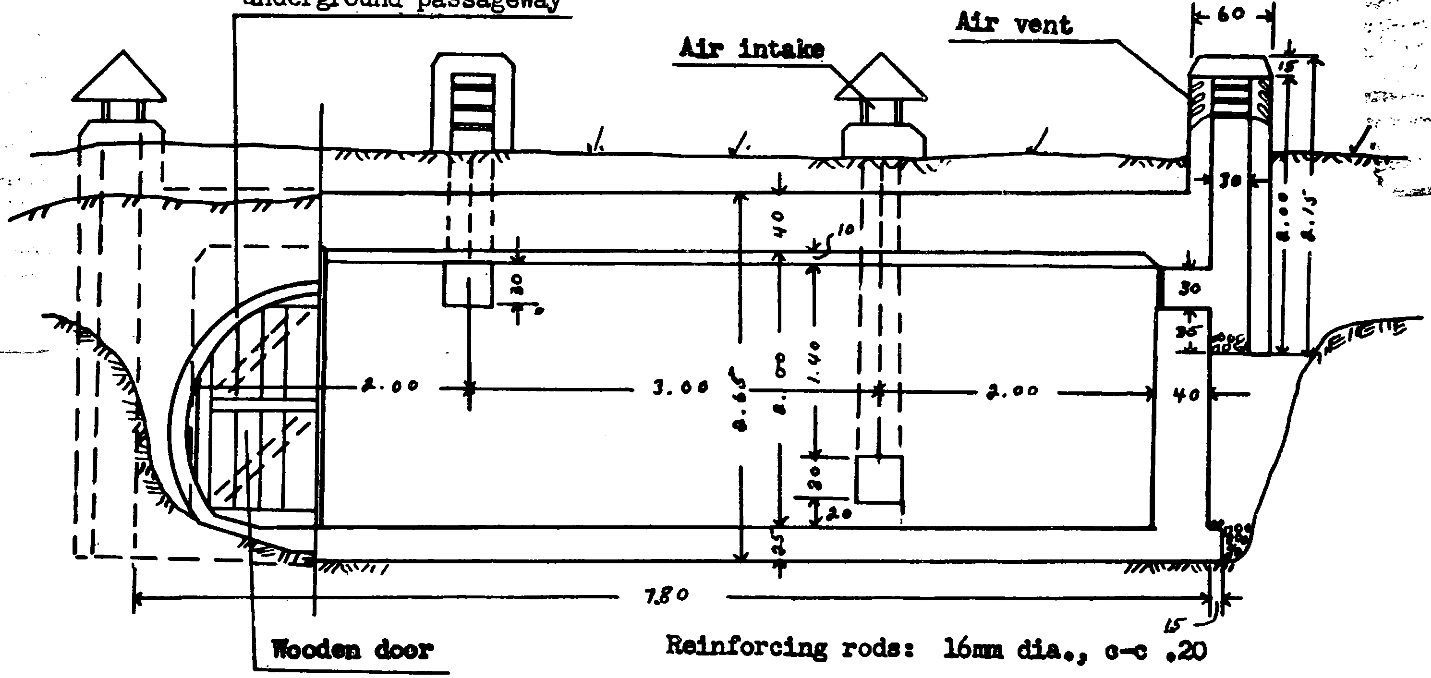


Reinforcing rods: 16mm dia., c-c .20

XVII - PROVISIONS STOREHOUSES

/TYPE I/ (Continued)

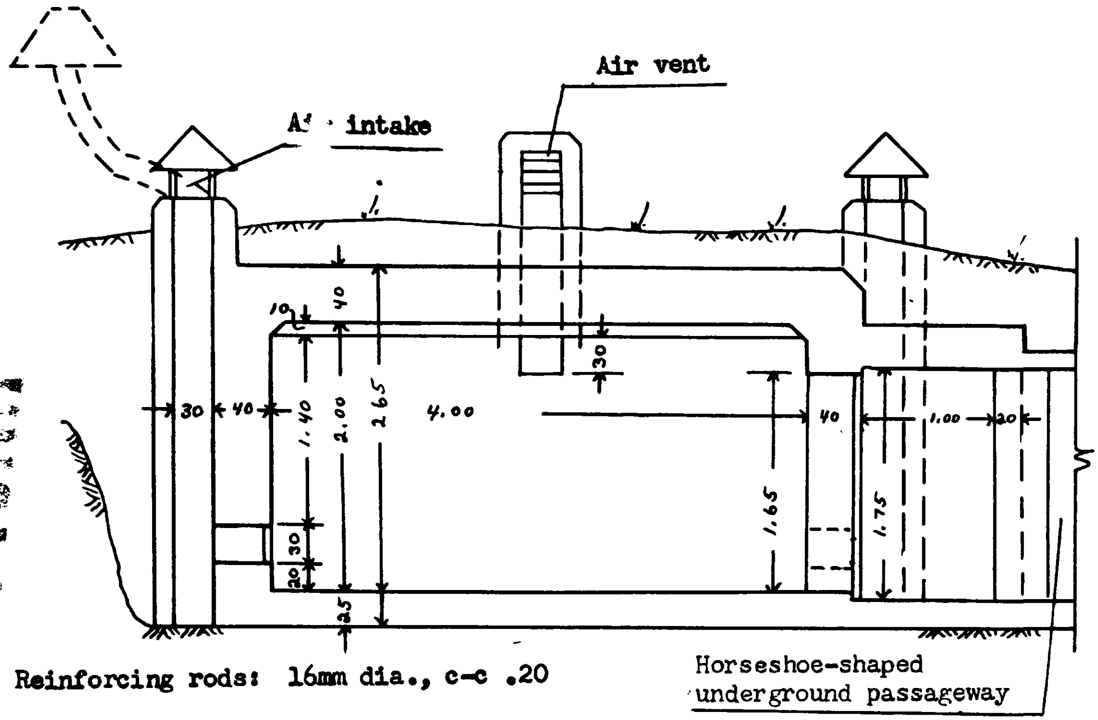
SECTION A-A



XVII - PROVISIONS STOREHOUSES

/TYPE I/ (Continued)

SECTION B-B (ELEVATION, WHEN BUILT AT JUNCTURE OF UNDERGROUND PASSAGEWAY)

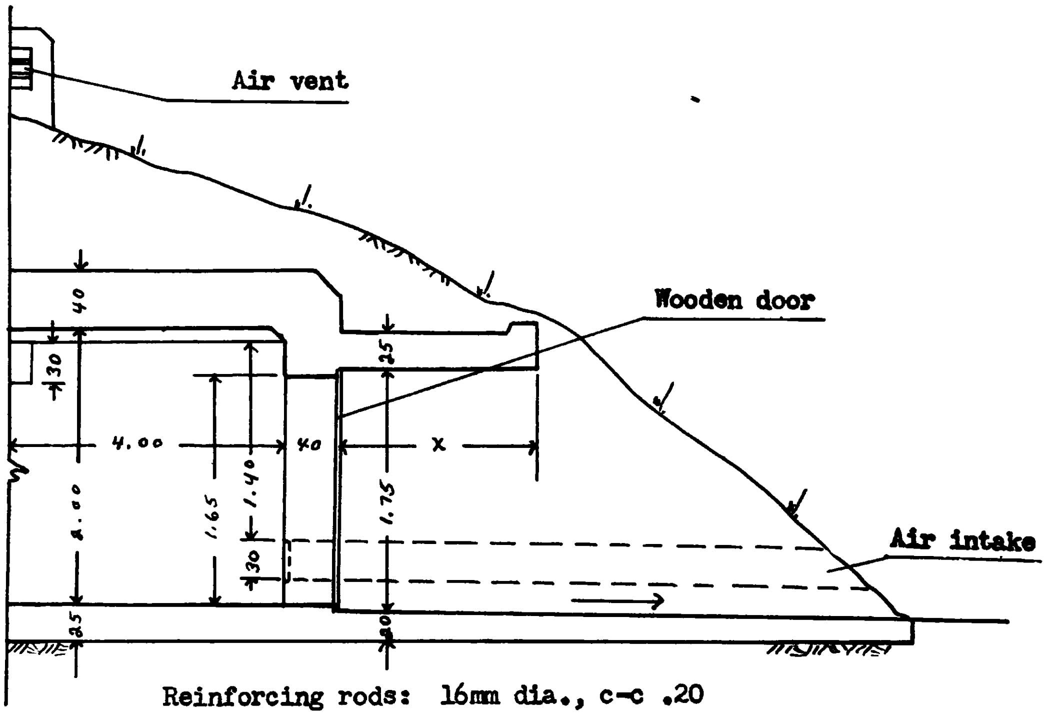


Reinforcing rods: 16mm dia., c-c .20

XVII - PROVISIONS STOREHOUSES

/TYPE I/ (Continued)

SECTION B-B (ELEVATION, WHEN BUILT IN A HILLSIDE)

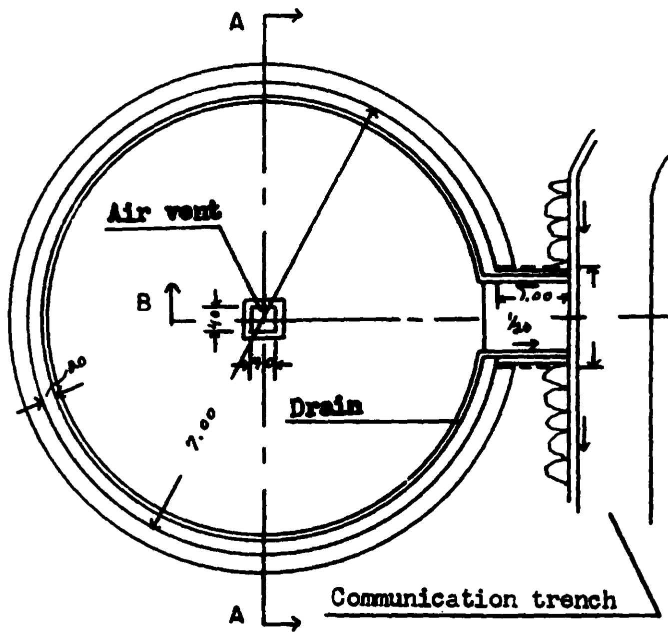


Reinforcing rods: 16mm dia., c-c .20

XVII - PROVISIONS STOREHOUSES

/TYPE II (BUN-SHAPED)/

PLAN CROSS SECTION



1. This type can be used in closely packed, sandy earth or in ordinary soil, with the exception of gravelly or rocky soil; its particular feature is that it can be constructed by using forms as a single unit.

Sequence of Construction:

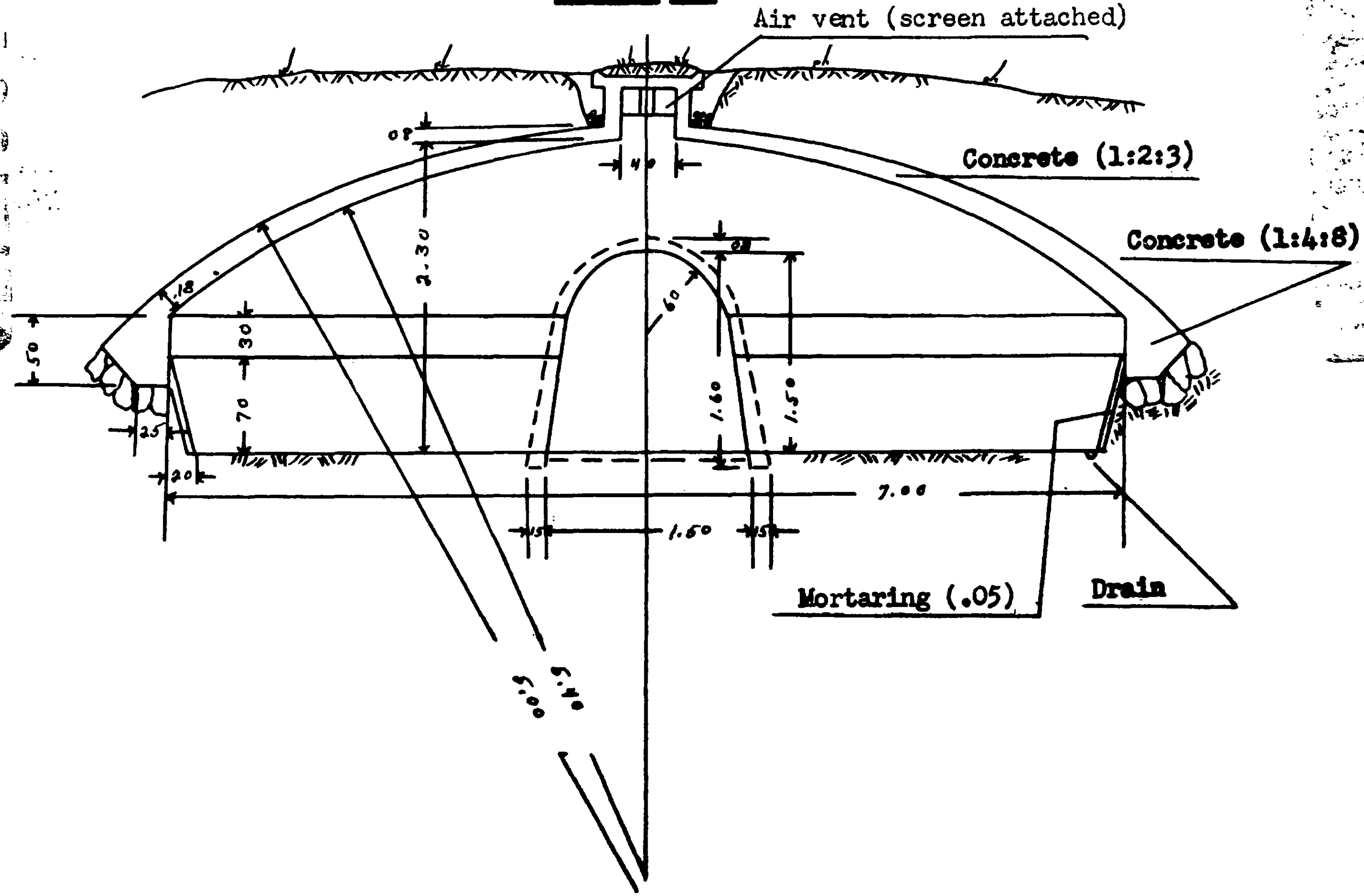
(1) Excavate base section. Make a foundation of gravel or small broken stones, as soil conditions warrant. Set 1:4:8 concrete.
(2) Pile earth in form of a mound; this should correspond to forms inside vault.
(3) Make firm the mound surface and spread empty (TN:?) cement bags.
(4) On top of this set fine gravel-concrete (ratio 1:2:4) firmly packed; construct a vault. At this time allow for changes in thickness of vault concrete; indicate by planting bamboo on top of mound; take care that no extra material is added.
(5) Some time later carry out excavations around entrances and complete the interior.
(6) Earth piled on top of cover should be made distinct from surrounding area and care taken that no extra weight is added to the vault.

2. Housing: Lay timber flooring and insure adequate ventilation.
3. Provisions Storage Capacity: Enough for one platoon for three months.
4. Materials Required:
   #3 concrete (ratio 1:2:4) 7.5 cu m
   #4 concrete (ratio 1:4:8) 5.5 cu m
   #2 mortar (ratio 1:3) 1.0 cu m

XVII - PROVISIONS STOREHOUSES

/TYPE II (BUN-SHAPED)/ (Continued)

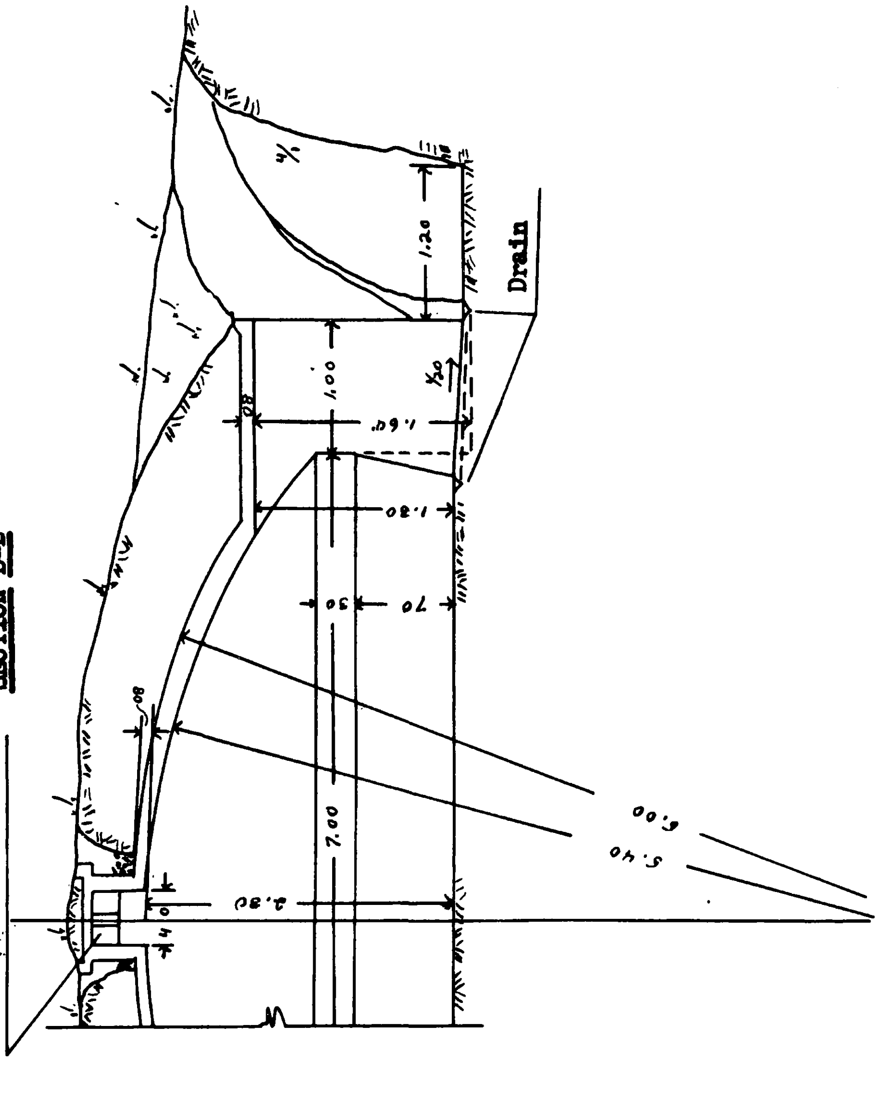
SECTION A-A



XVII - PROVISIONS STOREHOUSES

/TYPE II (BUN-SHAPED)/ (Continued)

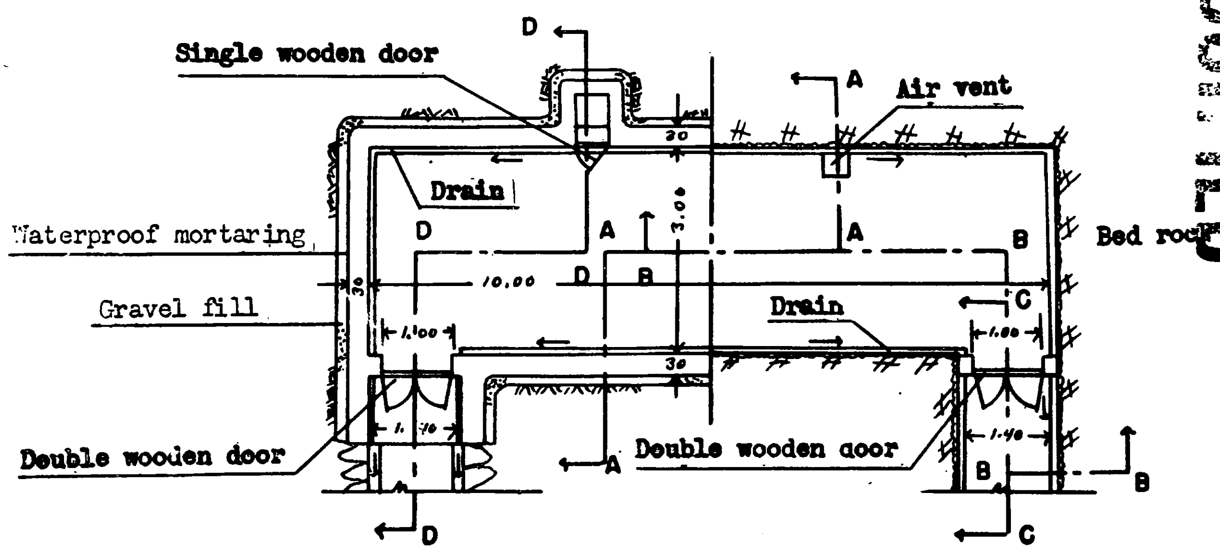
SECTION B-B



XVII - PROVISIONS STOREHOUSES

/TYPE III/

PLAN CROSS SECTION



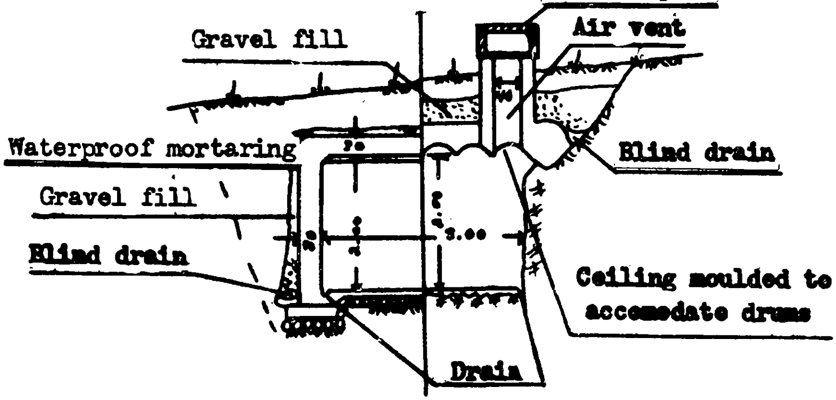
Reinforcing rods: 19mm dia., c-c .20

UNCLASSIFIED

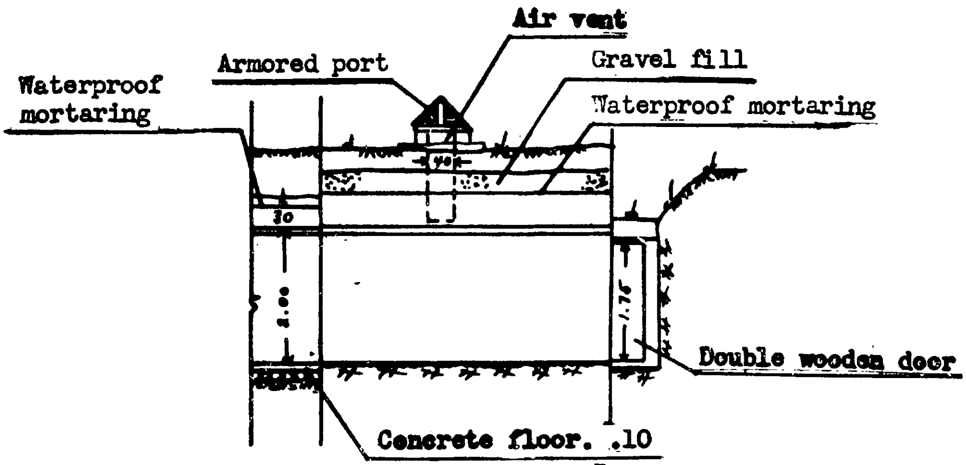
XVII - PROVISIONS STOREHOUSES

/TYPE III/ (Continued)

SECTION A-A



SECTION B-B



Important Points: Lay wooden floor and insure adequate ventilation.

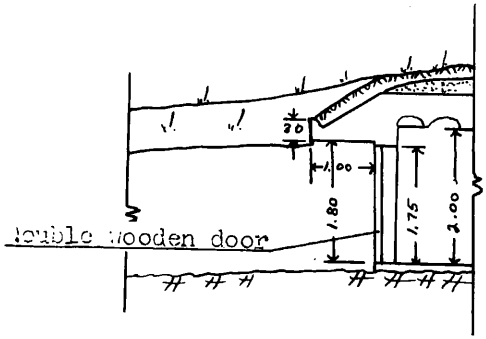
Capacity for Housing Provisions: 1 platoon for 3 months.

Reinforcing rods: 19mm dia., c-c .20

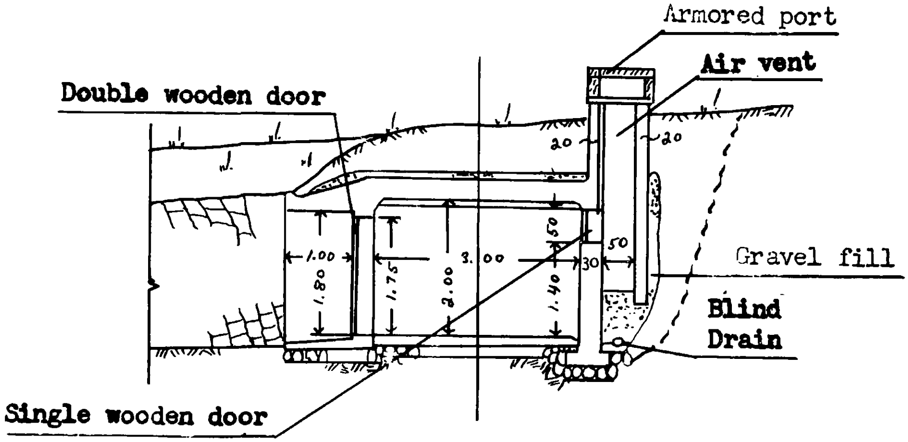
XVII - PROVISIONS STOREHOUSES

TYPE III (continued)

SECTION C-C

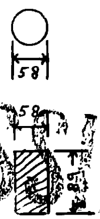


SECTION D-D



Reinforcing rods: 19mm dia., c-c .20

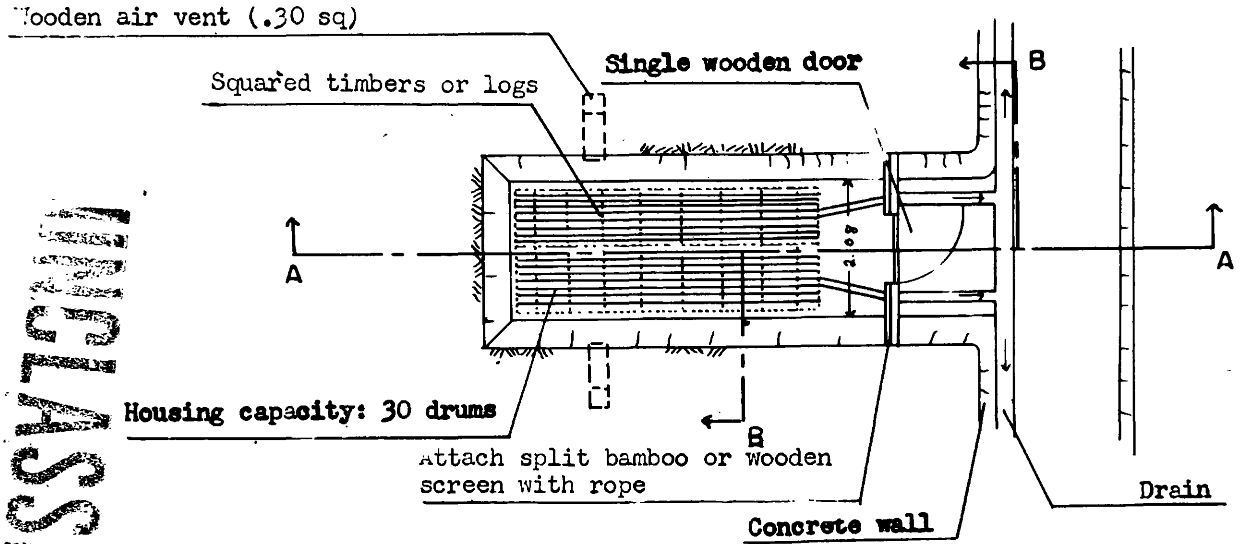
DIMENSIONS OF DRUM



XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE I/

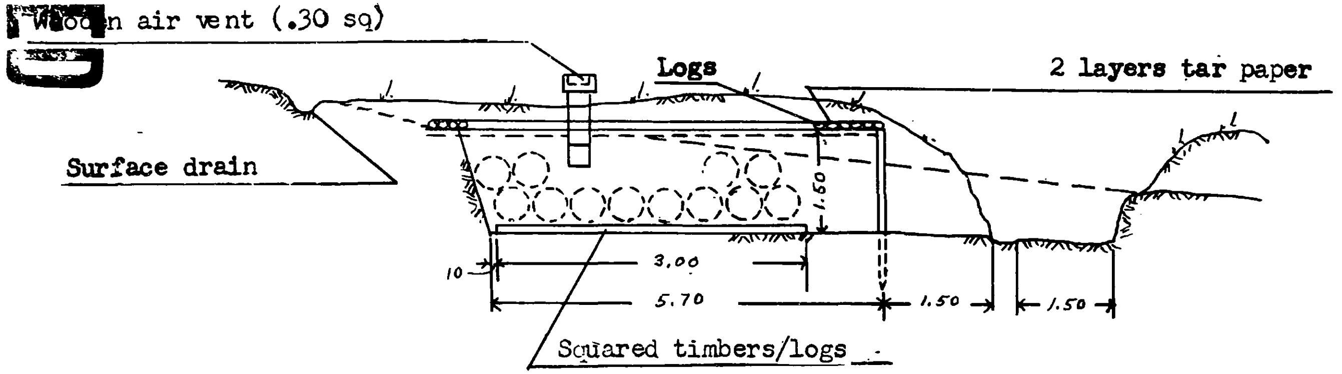
PLAN CROSS SECTION



XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE I/ (Continued)

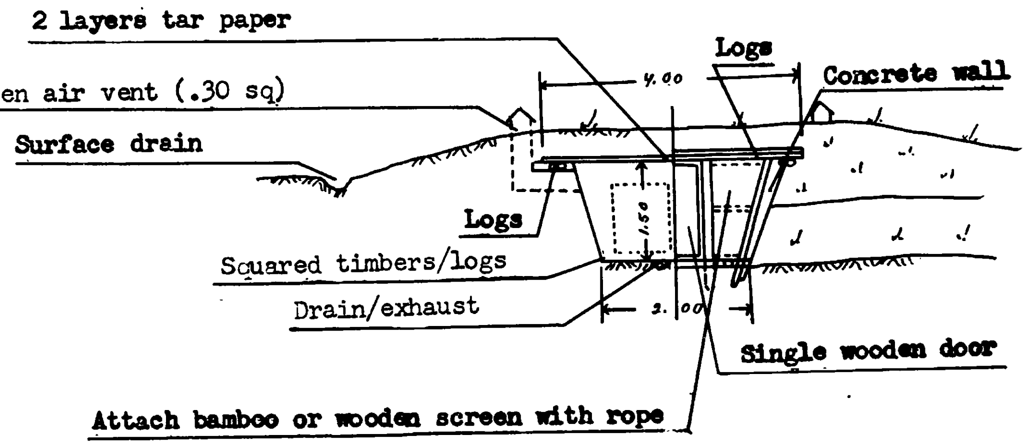
SECTION A-A



XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE I/ (Continued)

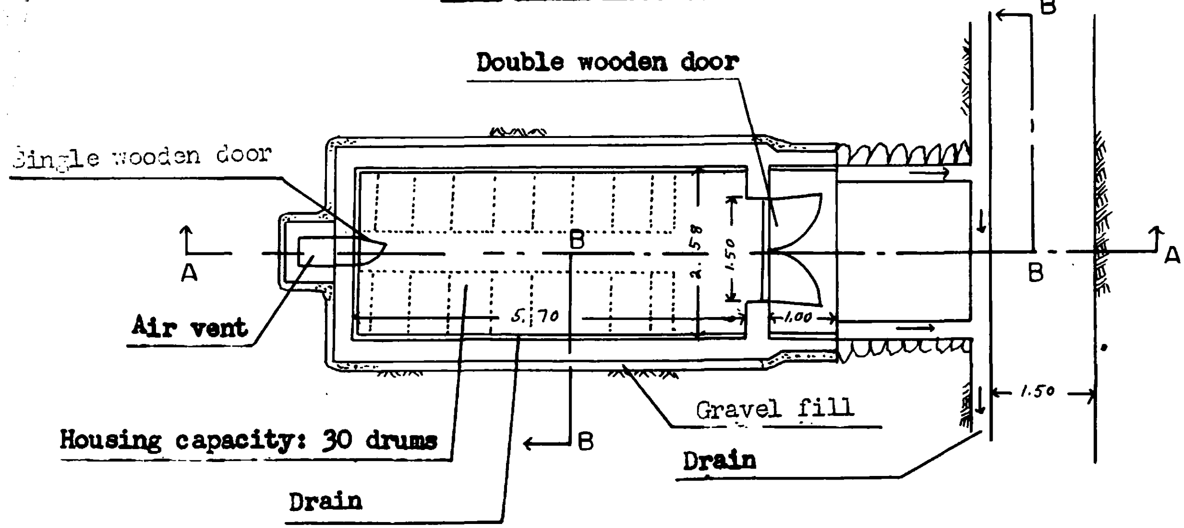
SECTION B-B



XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE II/

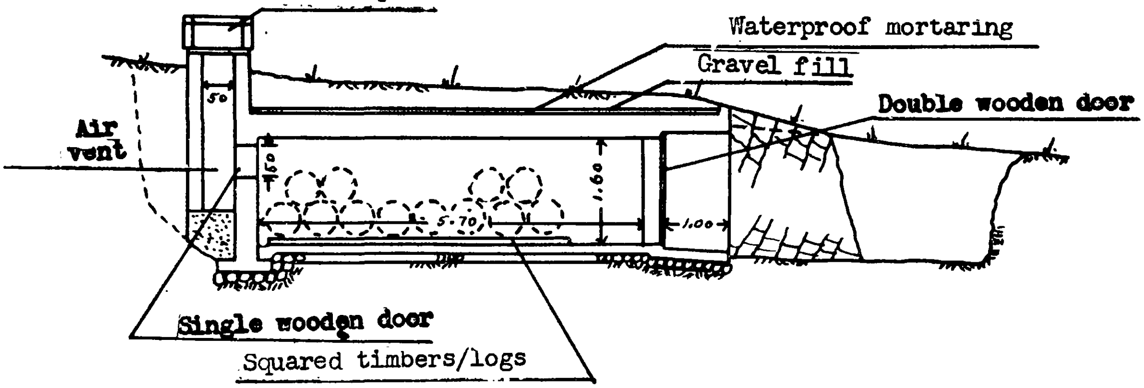
PLAN CROSS SECTION



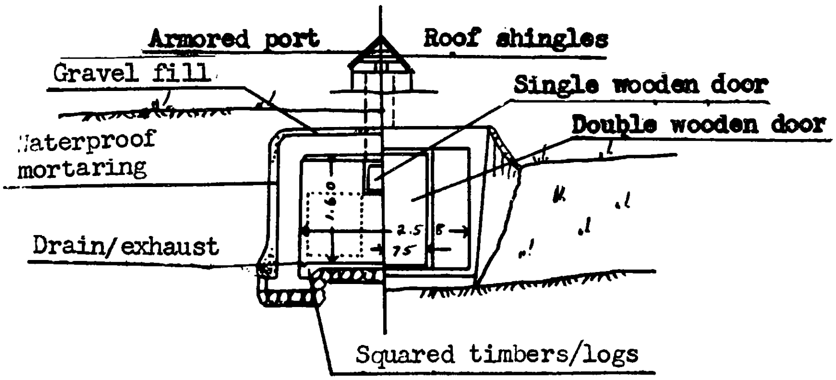
Reinforcing rods: 16mm dia., c-c .20

XVIII - FUEL AND LUBRICANT STOREHOUSES /TYPE II/ (Continued)

SECTION A-A



SECTION B-B



Note.

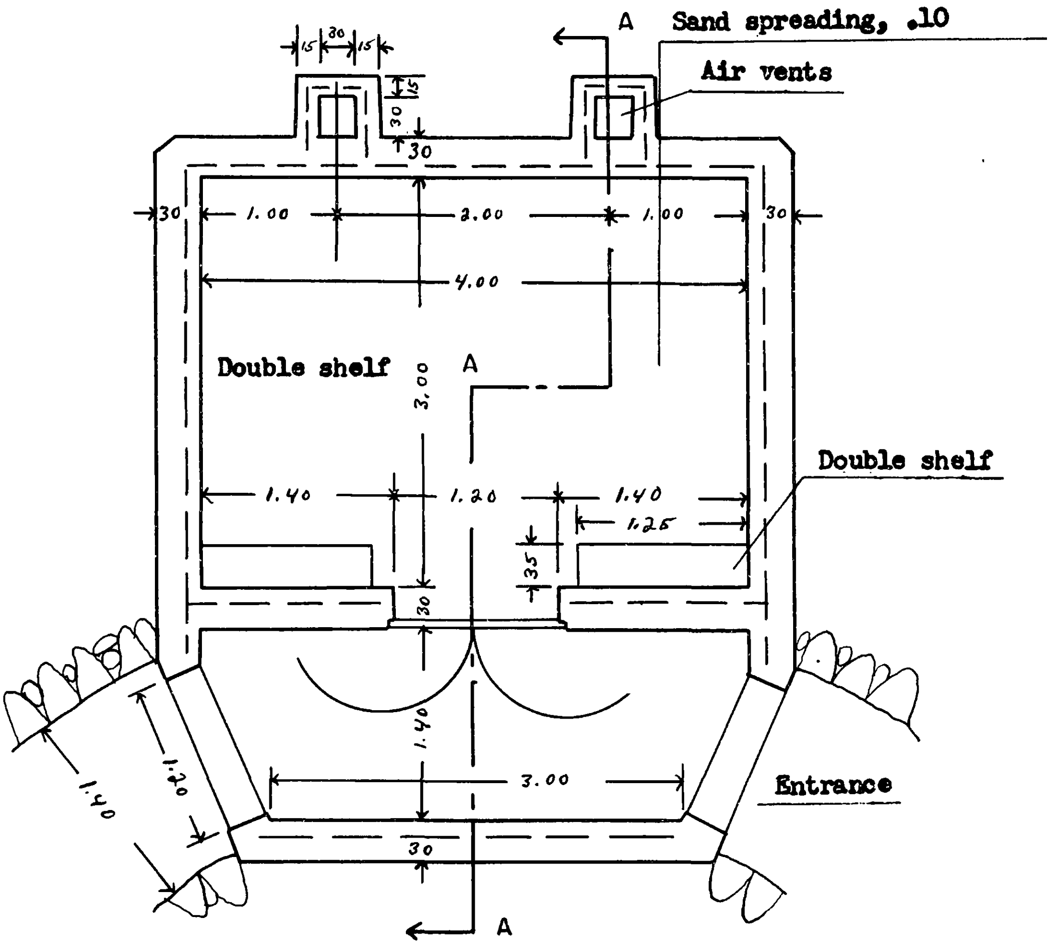
The water drain serves as a drain for leaking oil. If necessary provide catch basin.

Reinforcing rods: 16mm dia., c-c .20

XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE XII/ (IN A HILLSIDE)

PLAN CROSS SECTION

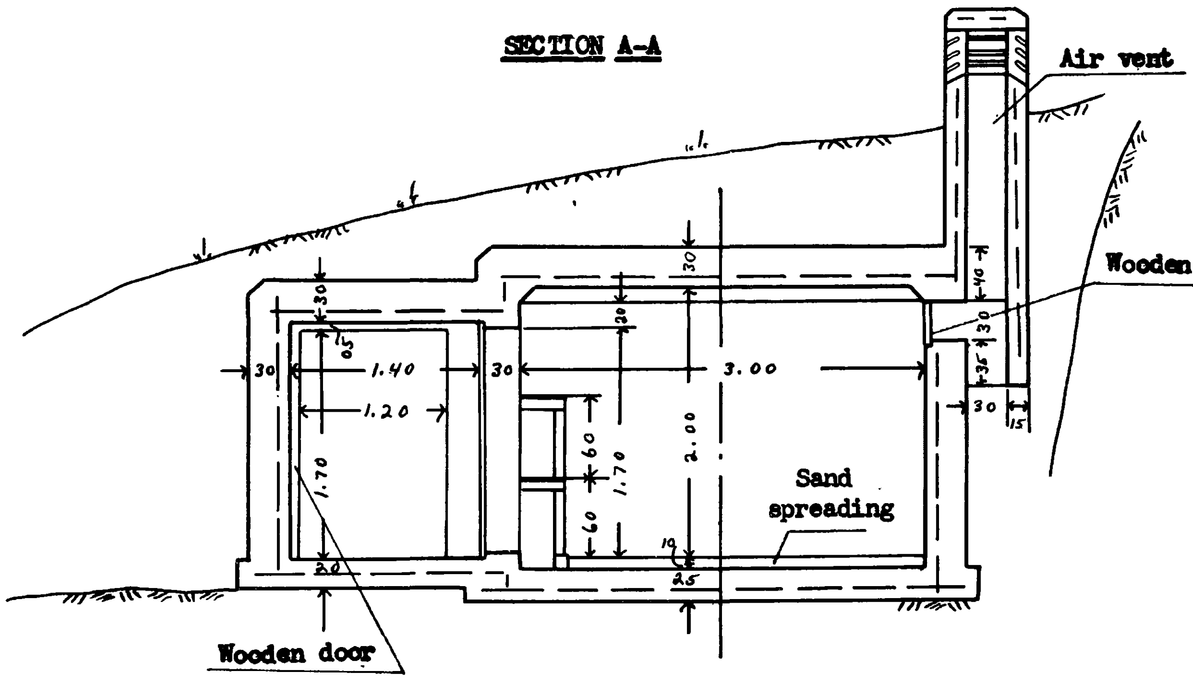


Reinforcing rods: 16mm dia., c-c .20

XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE III/ (IN A HILLSIDE) (Continued)

SECTION A-A

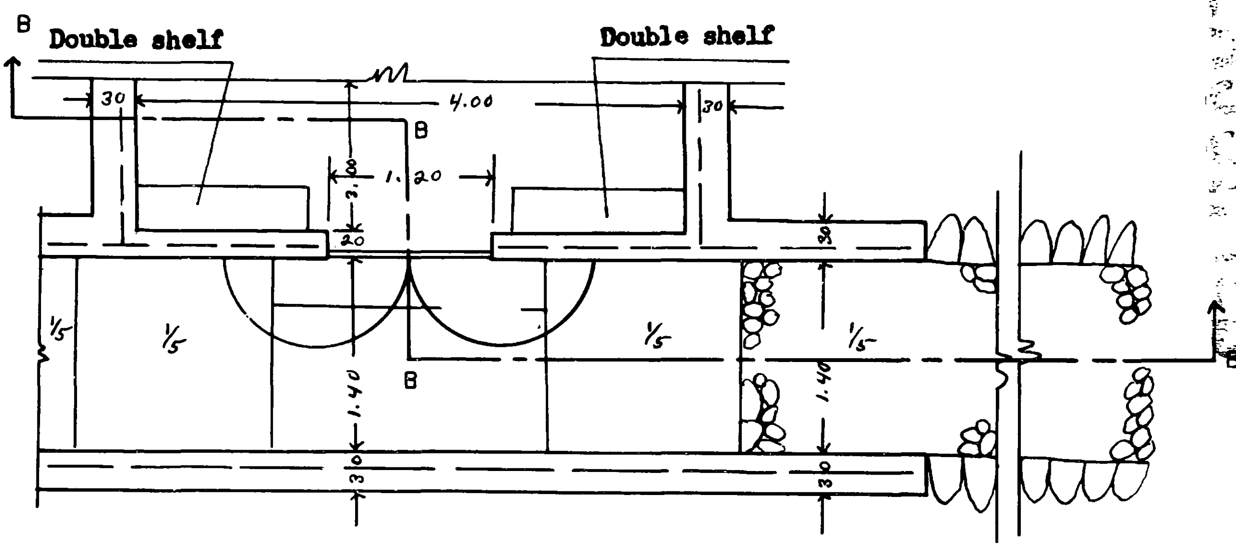


Reinforcing rods: 16mm dia., c-c .20

XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE IV/ (IN LEVEL GROUND)

PLAN CROSS SECTION

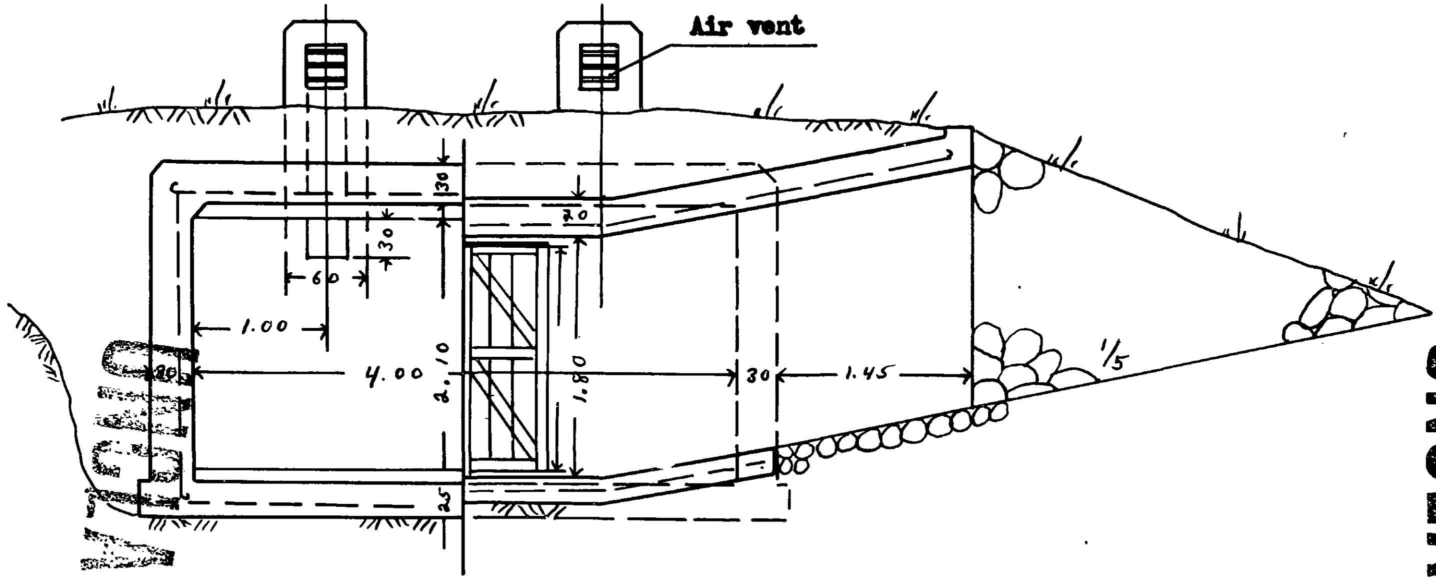


Reinforcing rods: 16mm dia., c-c .20

XVIII - FUEL AND LUBRICANT STOREHOUSES

/TYPE IV/ (IN LEVEL GROUND) (Continued)

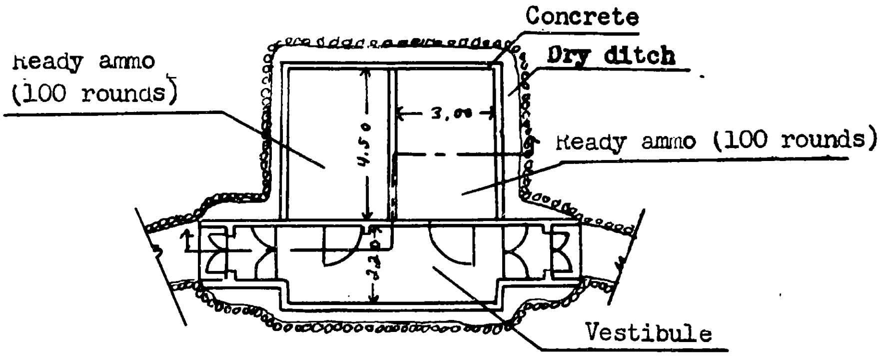
SECTION B-B

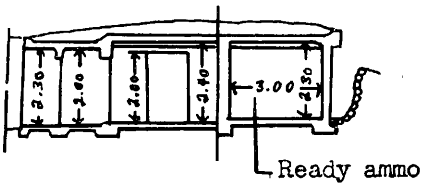


Reinforcing rods: 16mm dia., c-c .20

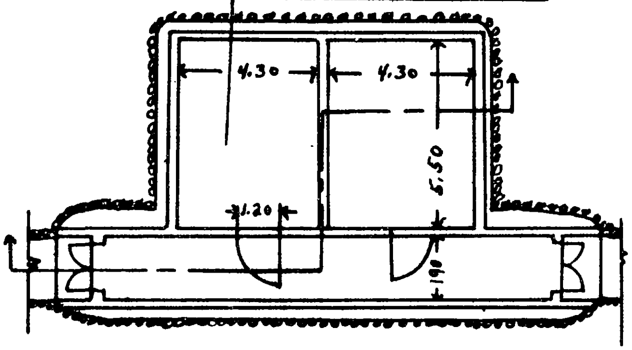
XIX - MAGAZINES

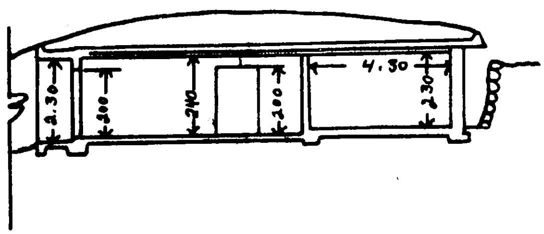
READY MAGAZINE FOR TYPE 89 15cm CANNON (200 ROUNDS)





READY MAGAZINE FOR TYPE 38 FIELD GUN (400 ROUNDS)

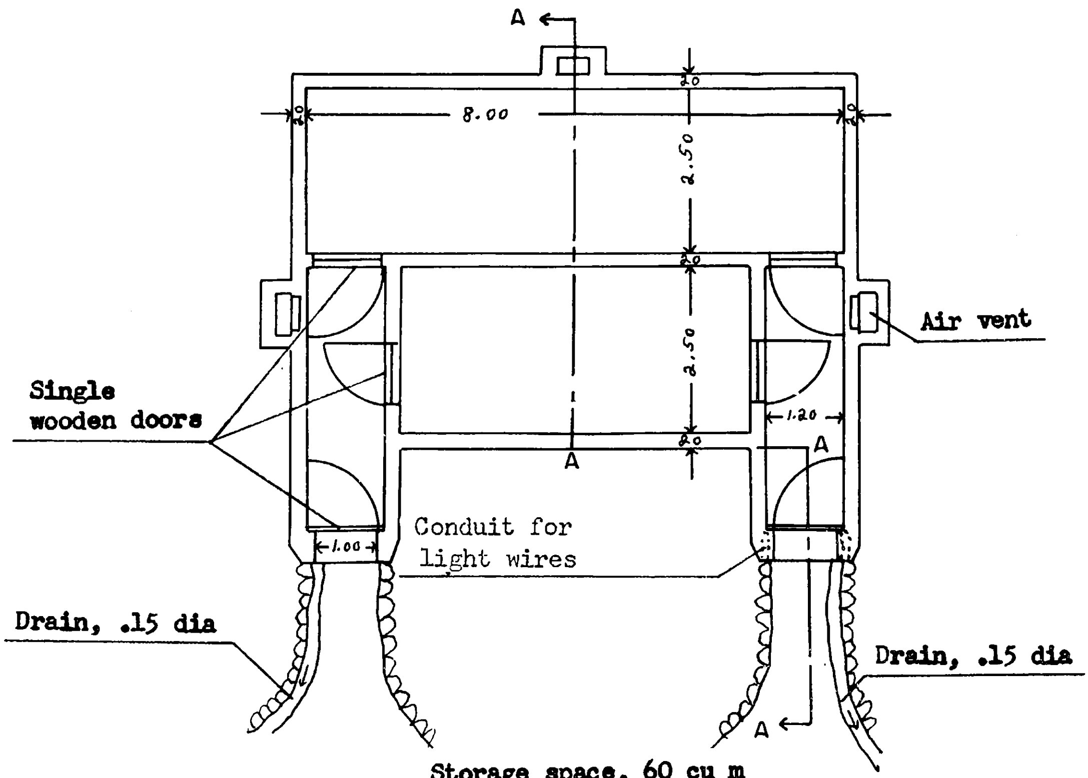




XIX - MAGAZINES

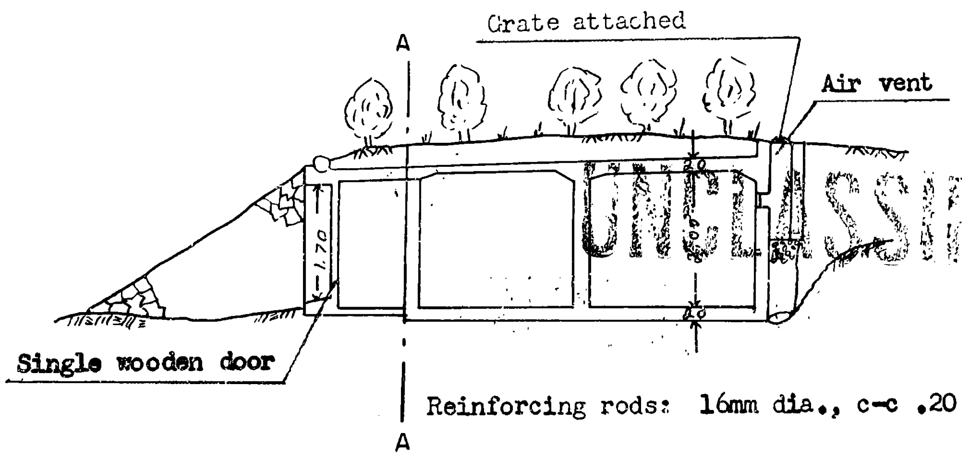
LARGE MAGAZINE (C STRENGTH)

PLAN CROSS SECTION



Storage space, 60 cu m
Amount of concrete: 40 cu m (approx.)

SECTION A-A

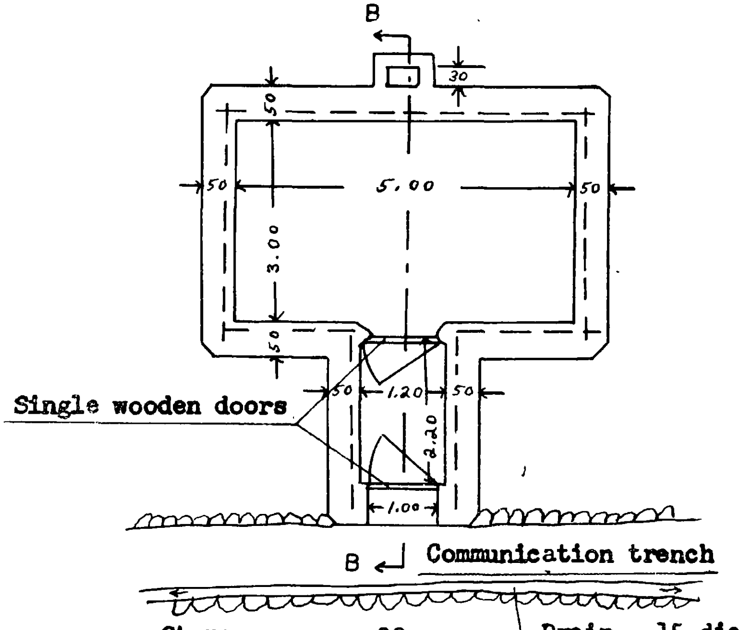


Reinforcing rods: 16mm dia., c-c .20

XIX - MAGAZINES

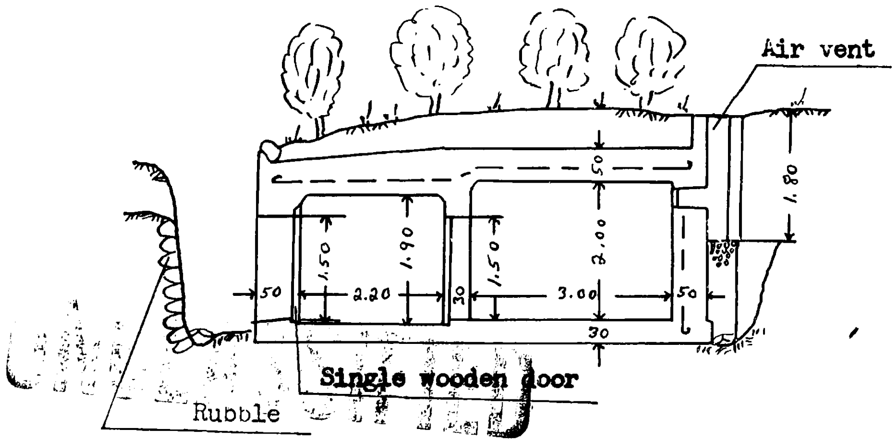
MEDIUM MAGAZINE (B STRENGTH)

PLAN CROSS SECTION



Storage space, 32 cu m
Amount of concrete: 46 cu m (approx.)

SECTION B-B

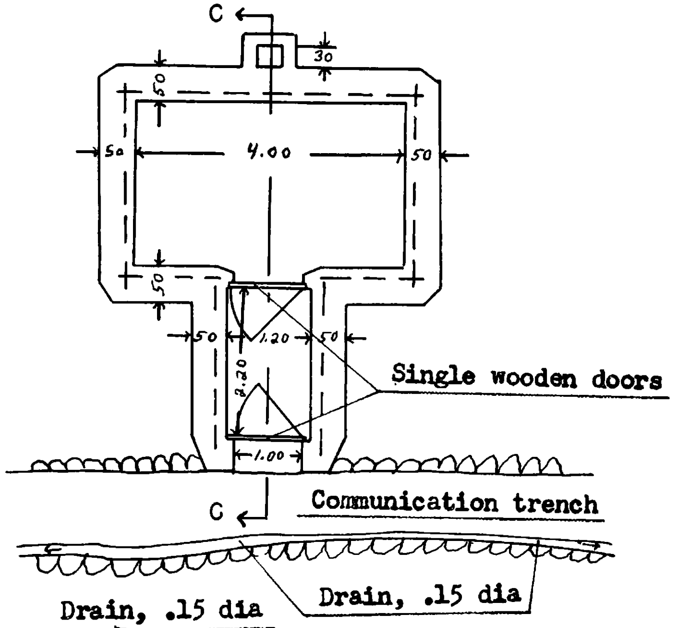


Reinforcing rods: 16mm dia., c-c .20

XIX - MAGAZINES

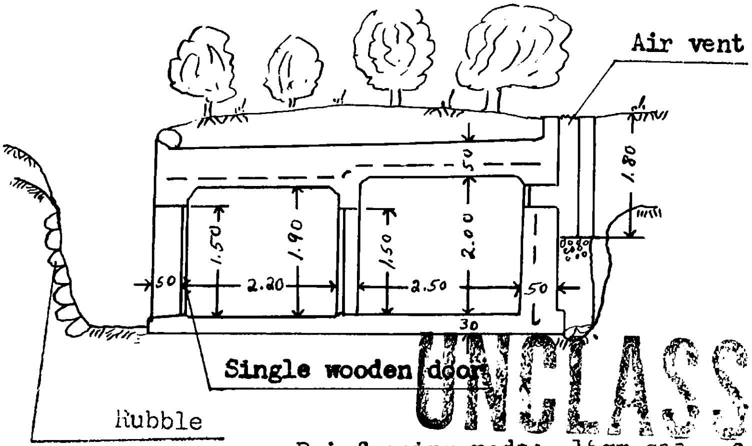
SMALL MAGAZINE (B STRENGTH)

PLAN CROSS SECTION



Storage space, 20 cu m
Amount of concrete: 32 cu m (approx.)

SECTION C-C

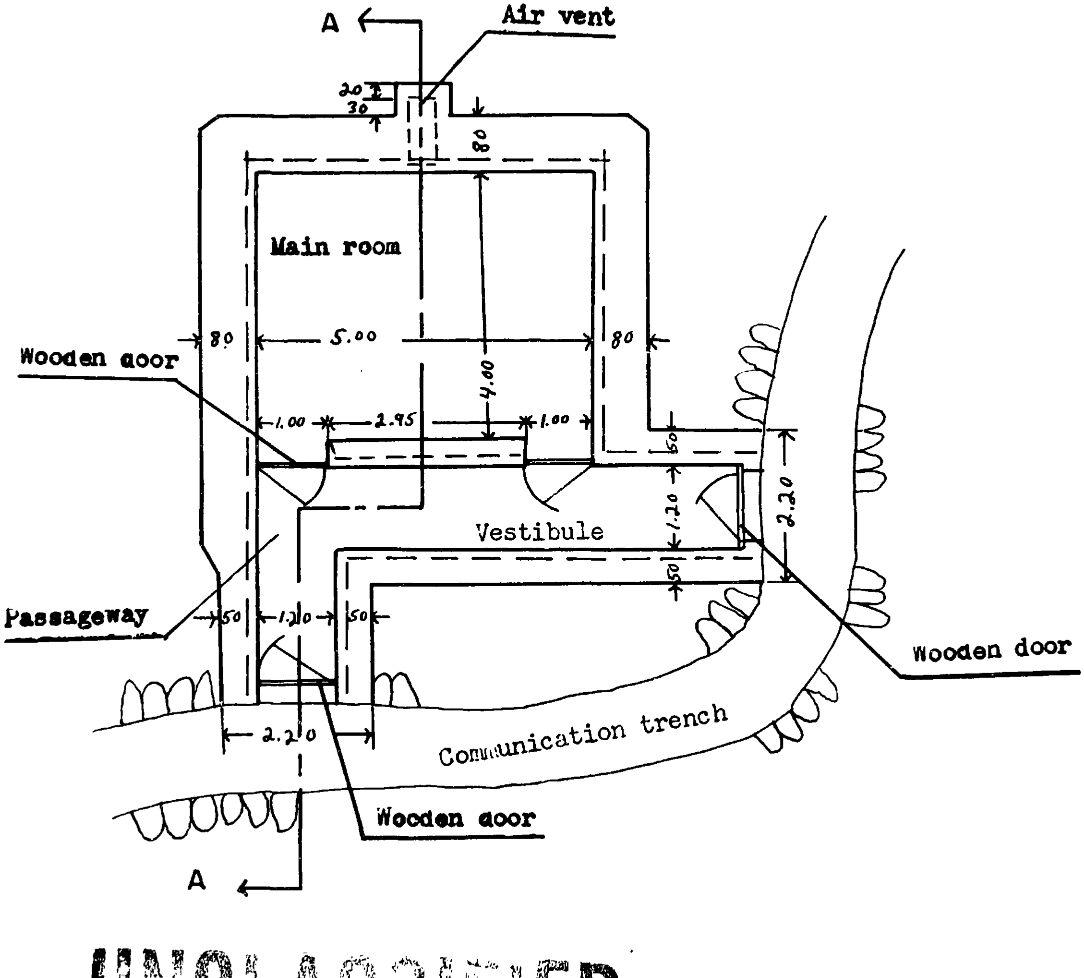


Reinforcing rods: 16mm dia., c-c .20

XIX - MAGAZINES

LARGE MAGAZINE

PLAN CROSS SECTION

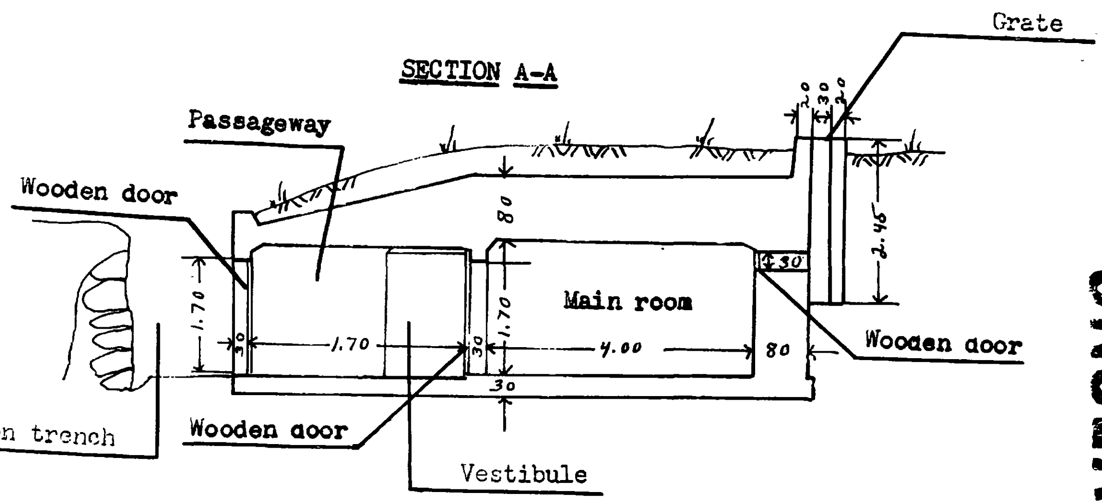


Reinforcing rods: 16mm dia., c-c .20

XIX - MAGAZINES

LARGE MAGAZINE (Continued)

SECTION A-A

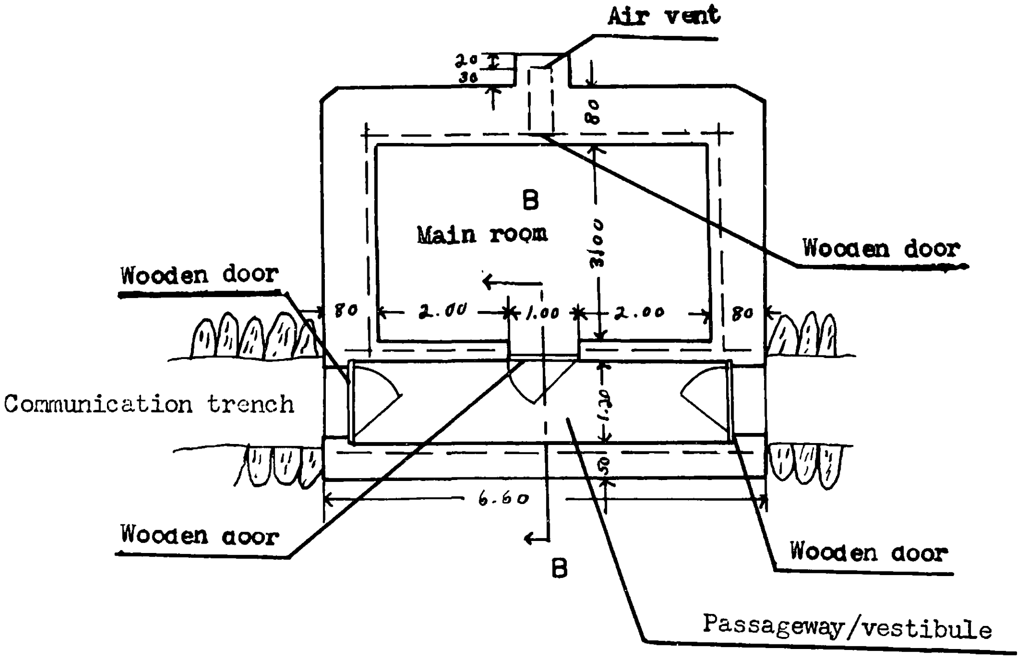


Reinforcing rods: 16mm dia., c-c .20

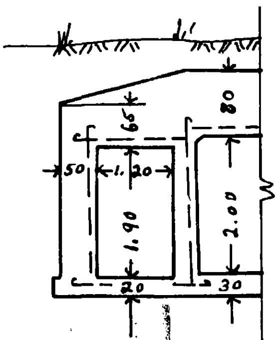
XIX - MAGAZINES

MEDIUM MAGAZINE

PLAN CROSS SECTION



SECTION B-B

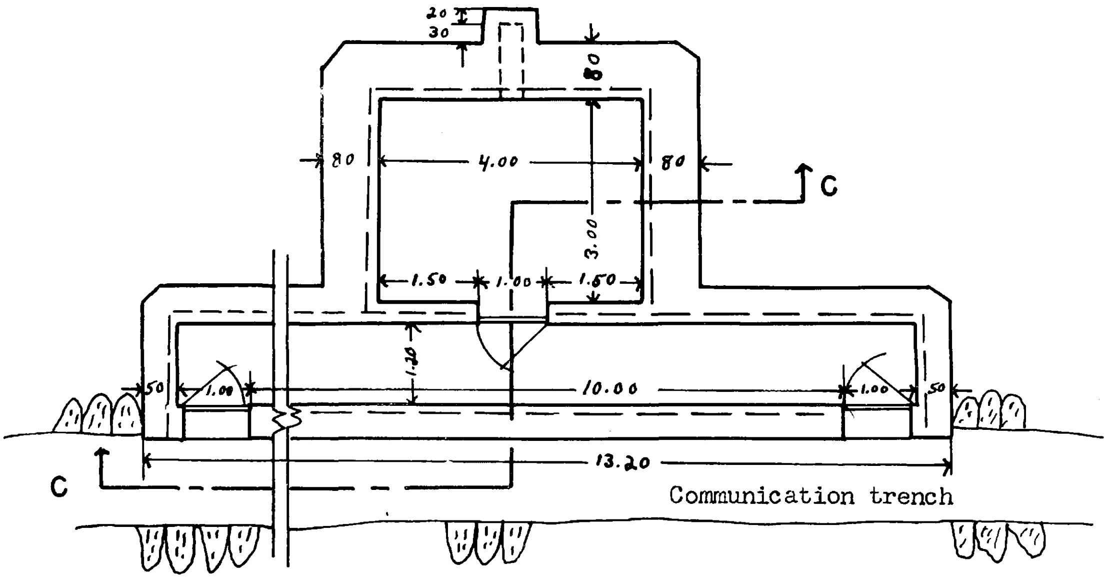


Reinforcing rods: 16mm dia., c-c .20

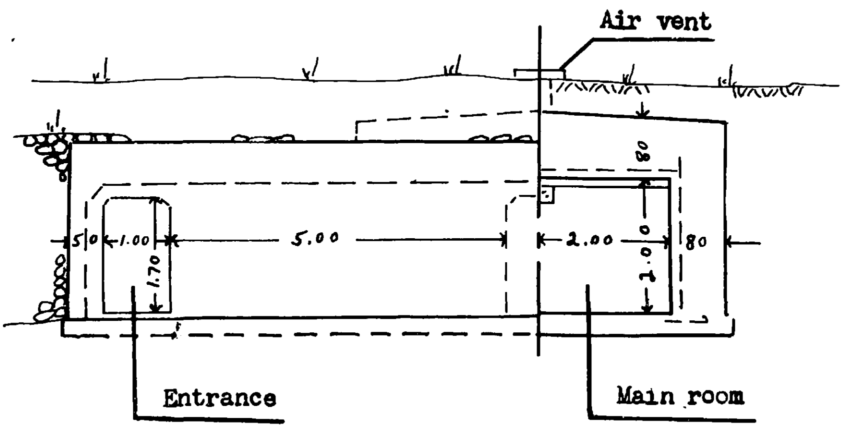
XIX - MAGAZINES

SMALL MAGAZINE

PLAN CROSS SECTION



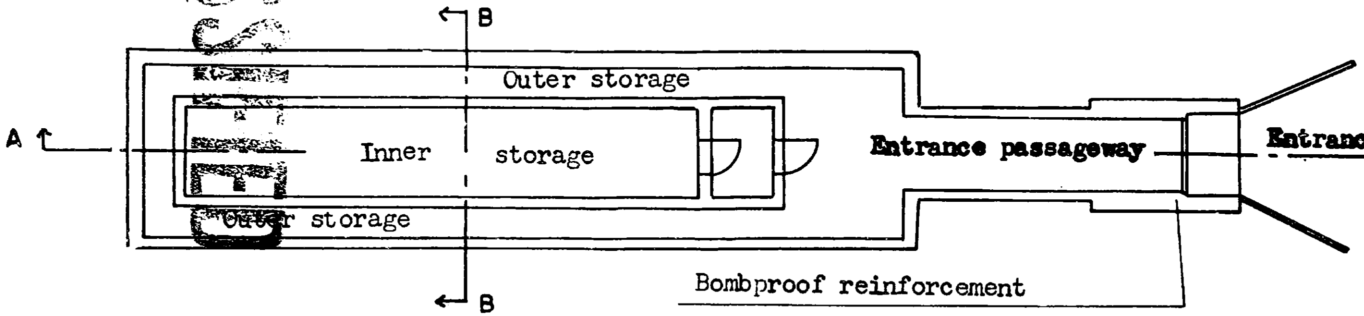
SECTION C-C



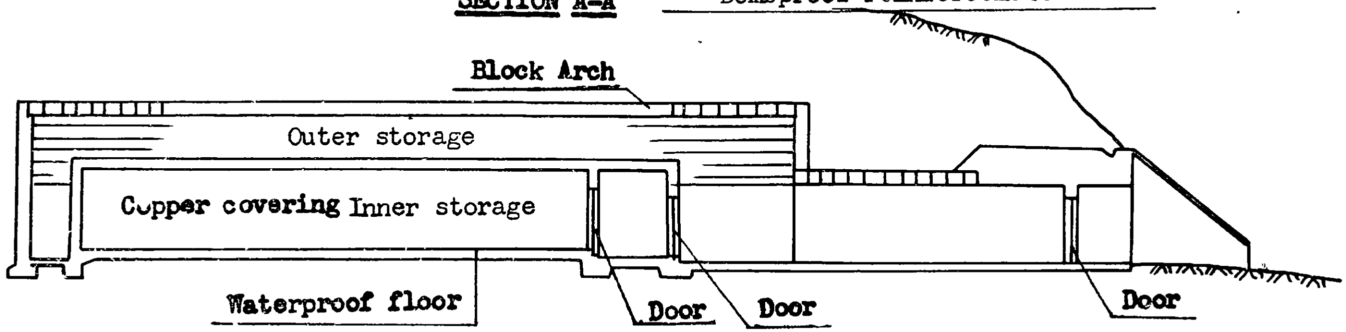
XIX - MAGAZINES

CAVE-TYPE POWDER MAGAZINE

PLAN CROSS SECTION



SECTION A-A

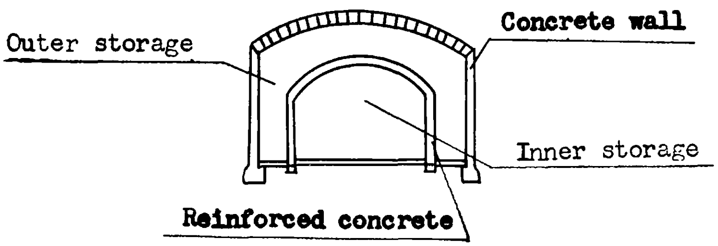


UNCLASSIFIED

CAVE-TYPE POWDER MAGAZINE (Continued)

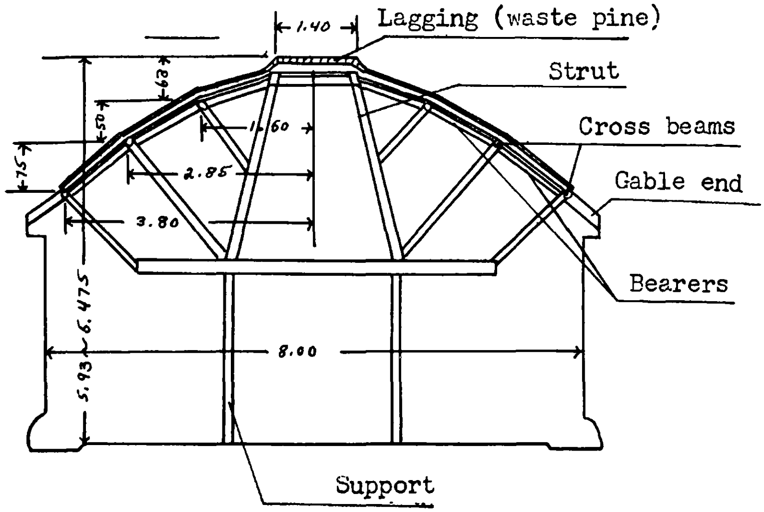
SECTION B-B

Block Arch

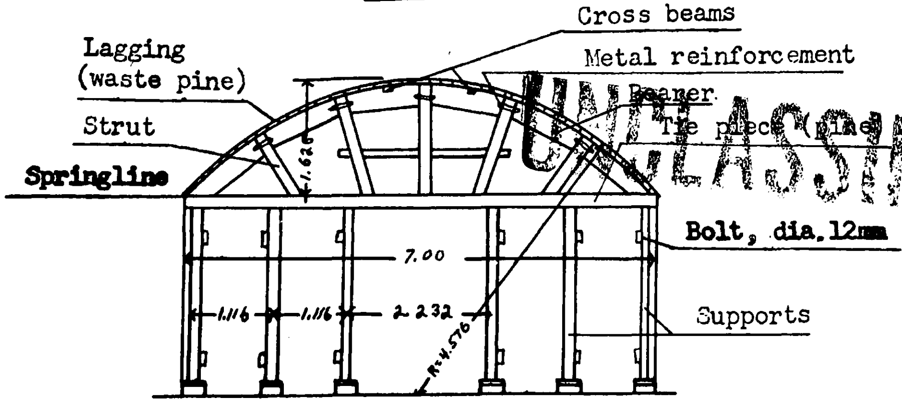


SURROUNDING WALL AND CENTERING USED IN CONSTRUCTION OF OUTER WALL OF CAVE-TYPE MAGAZINE

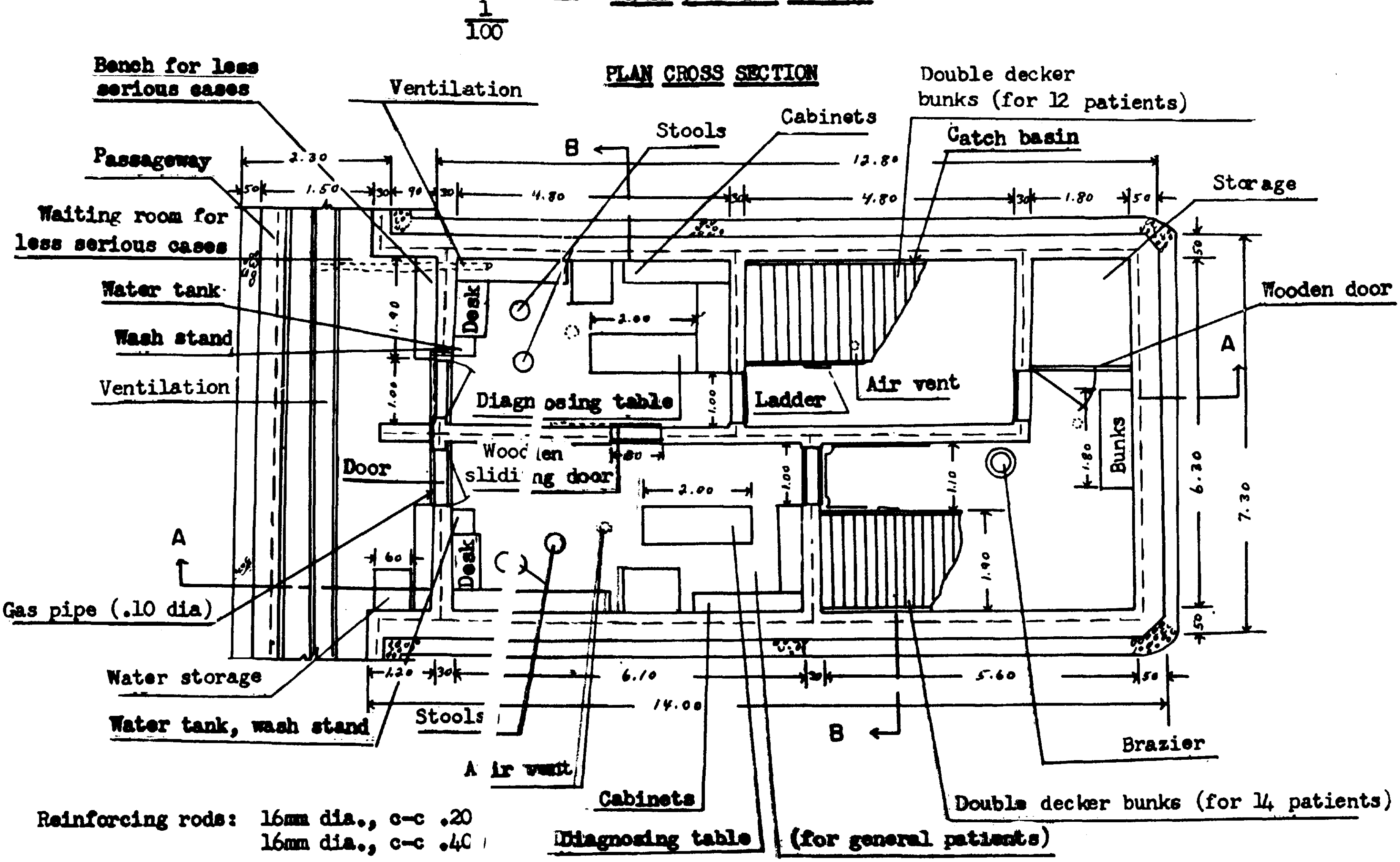
SURROUNDING WALL



CENTERING



XX - FIELD DRESSING STATION



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

List of Required Materials

Concrete.......................175 cu m
Steel Reinforcement ...... 6 tons
Forms { inner...........340 sq m
outer...........195 sq m }
Broken Stone............. 42 cu m

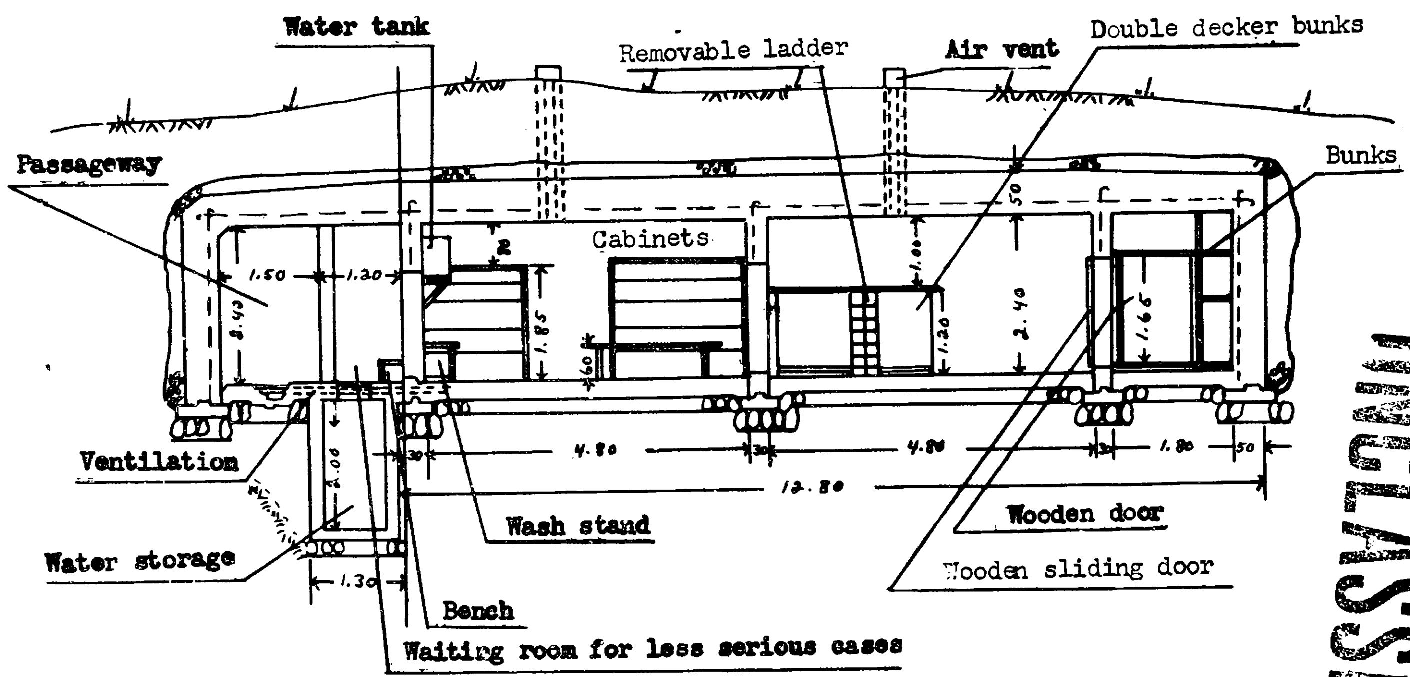
Accessories

Wooden doors.................6
Partition....................1
Benches......................2
Cover........................1
Bunks........................27 men
Shelves......................6 sets

Diagnosing tables........2
Chairs...................4
Chimneys.................4
Exhausts.................4
Water tank...............1
Wash stand...............1
Water drainage unit......1
Cover for drain..........1

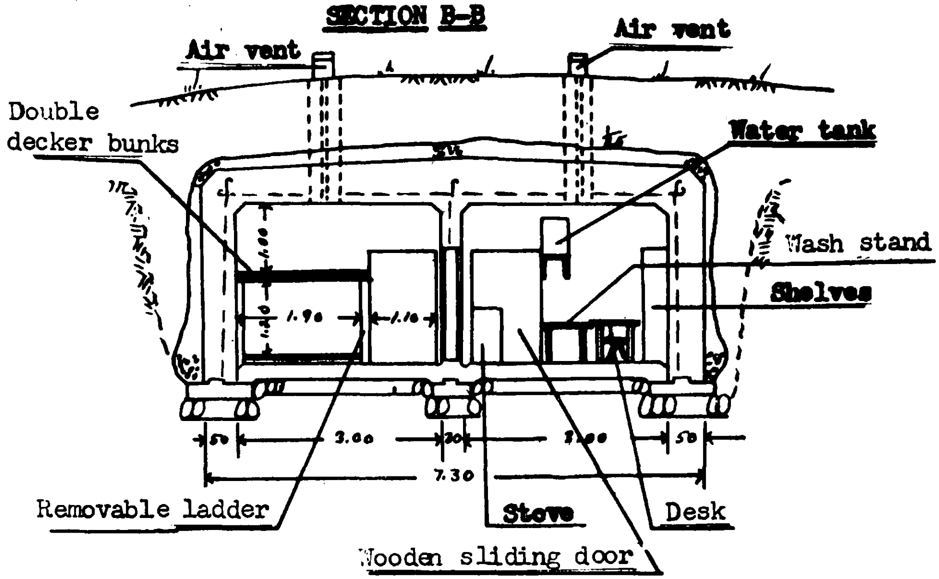
XX - FIELD DRESSING STATION

SECTION A-A



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

IX - FIELD DRESSING STATION



Reinforcing rods: 16mm dia., c-c .20
16mm dia., c-c .40

Notes:

1. These diagrams show a Field Dressing Station which is part of a system of underground shelters. If built separately, a ramp leading to the surface should be provided instead of the passageway illustrated.

2. Also, in such cases, a Fan Room, having hand-operated fans and filters, is provided.

3. Heating Unit: If necessary, it may be connected with water heater.

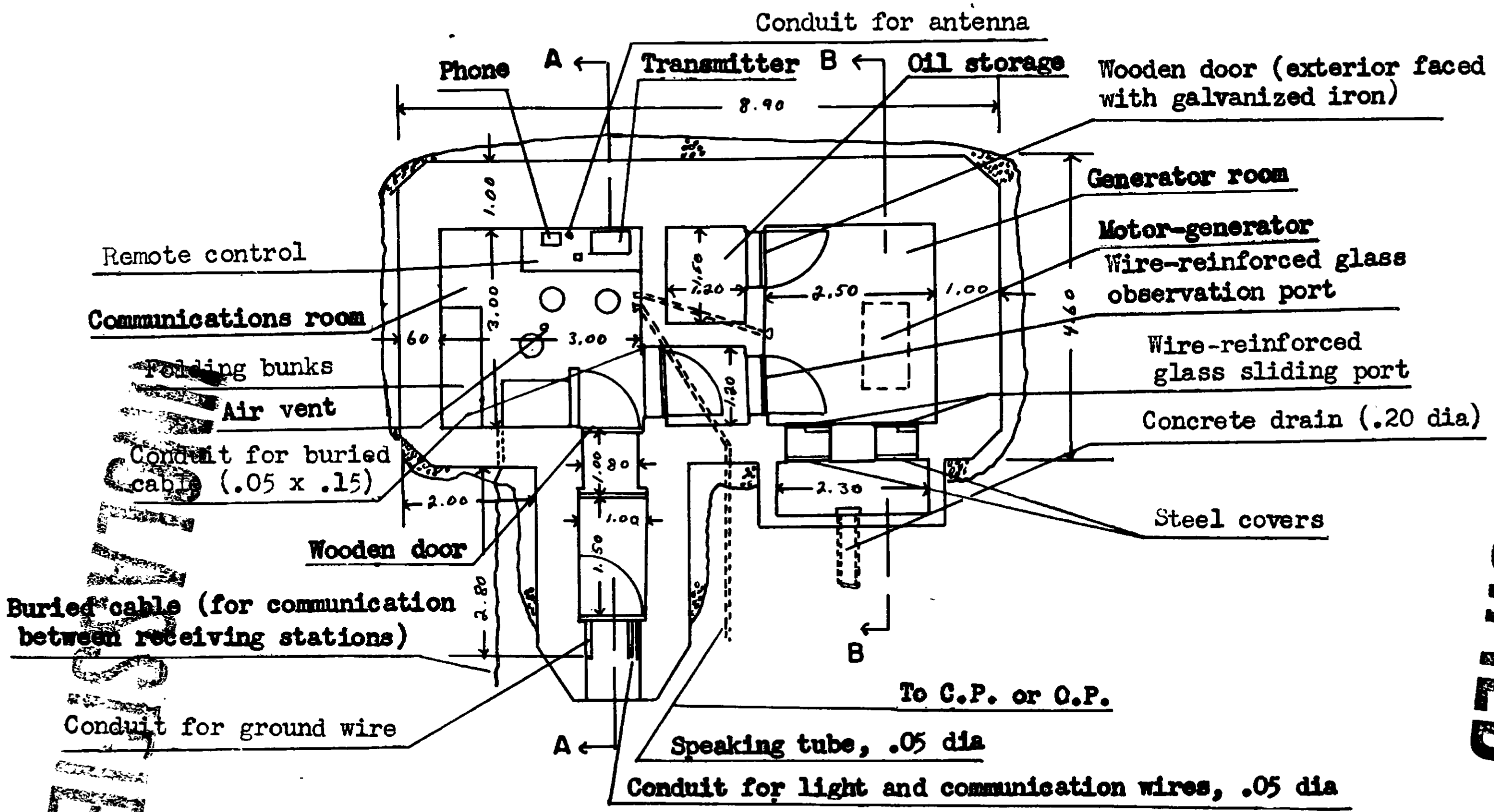
4. Leave a space of about 1cm between bunks and wall, so that water running down the wall will not flow into bunks.

5. The disposition of foundation, drainage, etc., should take into account factors of local terrain.

XXI - RADIO STATIONS

HOUSING TYPE 94 RADIO MARK 2 A - /TYPE I/

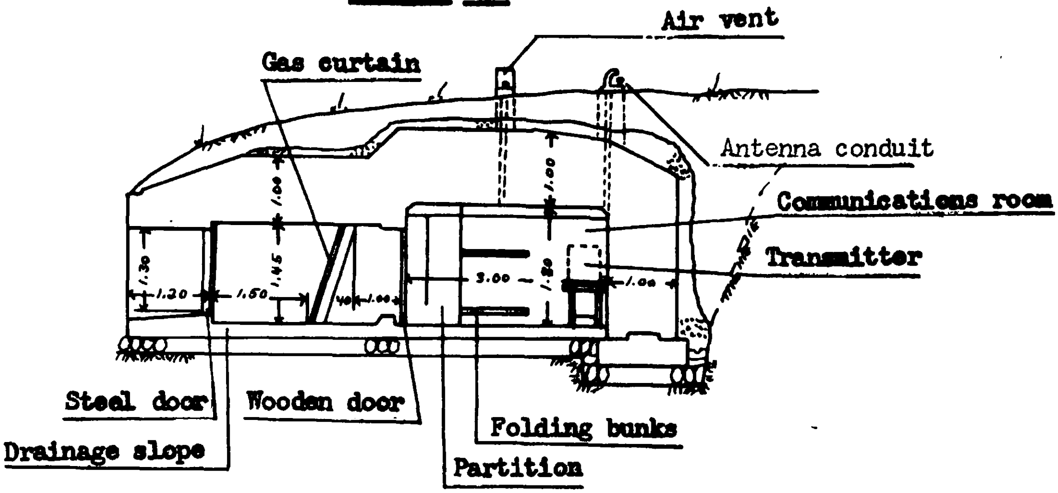
PLAN CROSS SECTION



XXI - RADIO STATIONS

HOUSING TYPE 94 RADIO MARK 2 A - /TYPE I/(Continued)

SECTION A-A



1. Diagrams illustrate radio station housing Type 94 Radio Mark 2 A.
2. If communications are not being carried on and a separate receiving station is not provided, remove telephone equipment from the communications room, install a receiving set, and abandon use of the underground cable.
3. The disposition of the foundation, drainage, and entrances should take into account factors of local terrain and soil.

List of Required Materials

Concrete	120 cu m
Steel Reinforcement	2.6 tons
Forms, inner	100 sq m
Forms, outer	170 sq m
Broken Stone	22 cu m

Reinforcing rods:
16mm dia., c-c .20
16mm dia., c-c .40

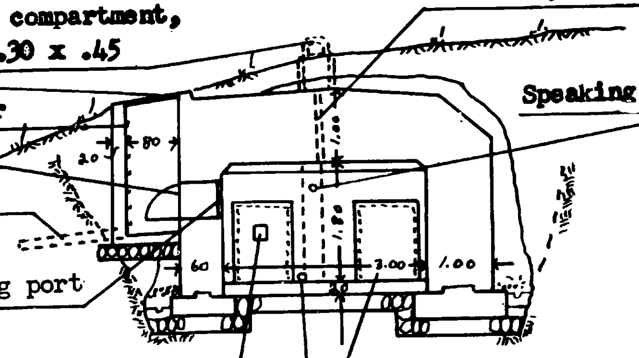
Accessories

Entrance door, steel	1
Entrance door, wooden	1
Wooden cover	1
Gas curtain	1
Wooden partition	1
Sound-proof room	1
Steel covers	2
Folding bunks	2
Desks	2
Ladders	2
Conduit for cable	1
Conduit for antenna	1
Speaking tubes	1
Air vent	1
Drainage unit	1
Miscellaneous	

XXI - RADIO STATIONS

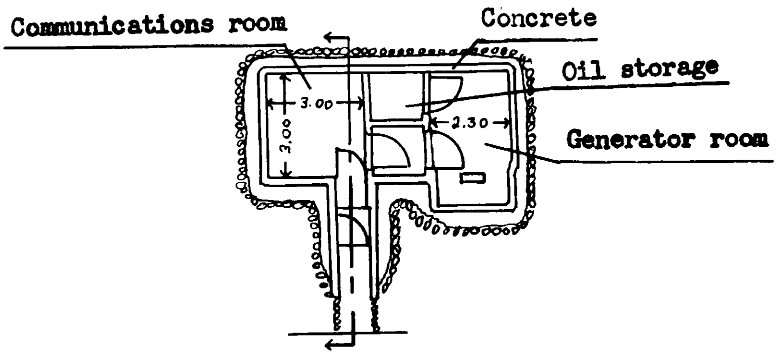
HOUSING TYPE 94 RADIO MARK 2 A - /TYPE I/ (Continued)

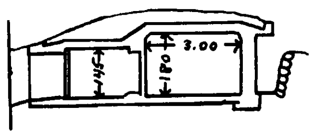
SECTION B-B



XXI - RADIO STATIONS

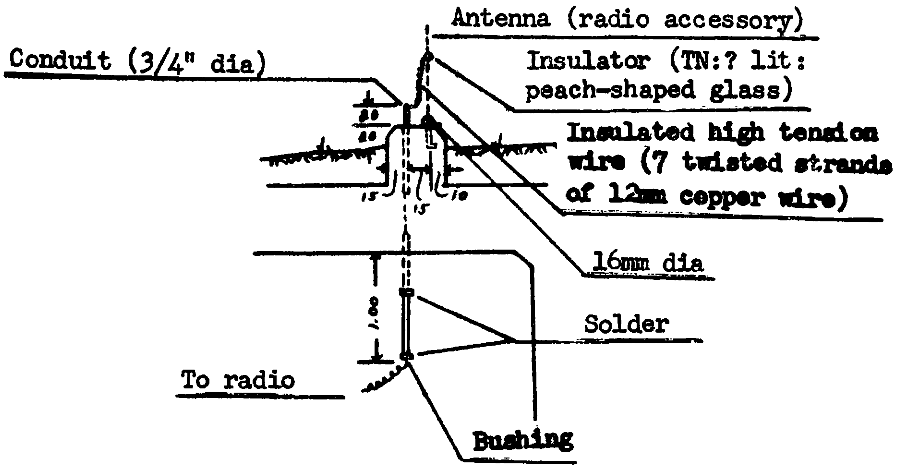
HOUSING TYPE 94 RADIO MARK 2 A - /TYPE II/



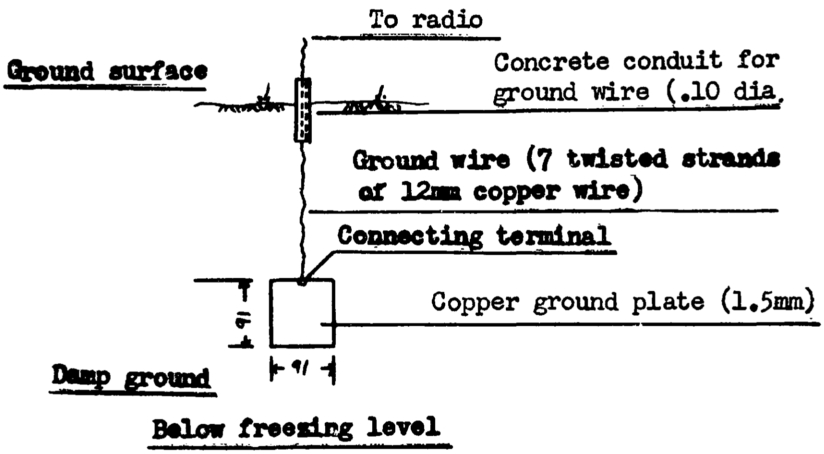


XXI - RADIO STATIONS

DETAIL OF ANTENNA CONDUIT

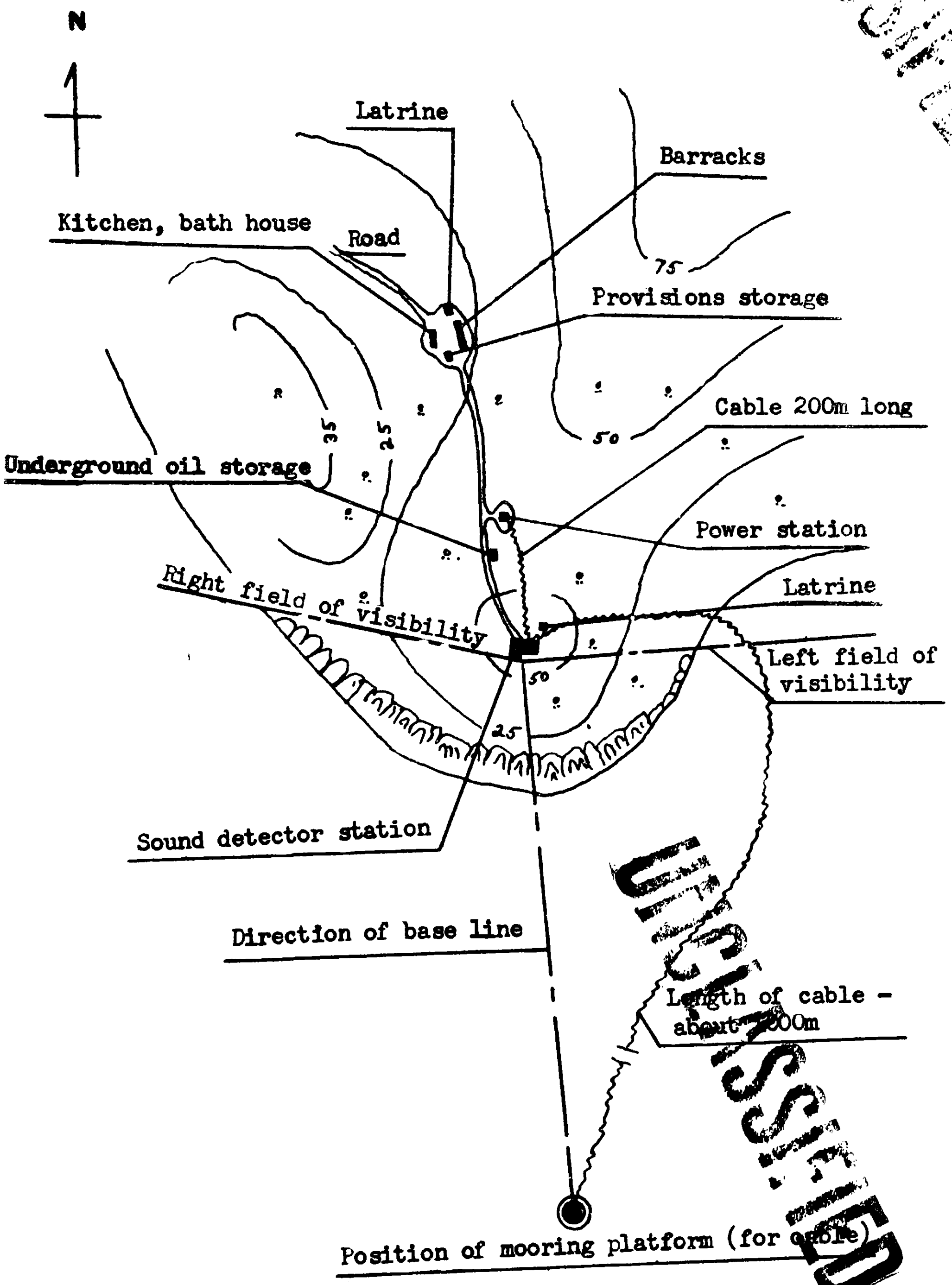


DETAIL OF GROUND PLATE BURIAL



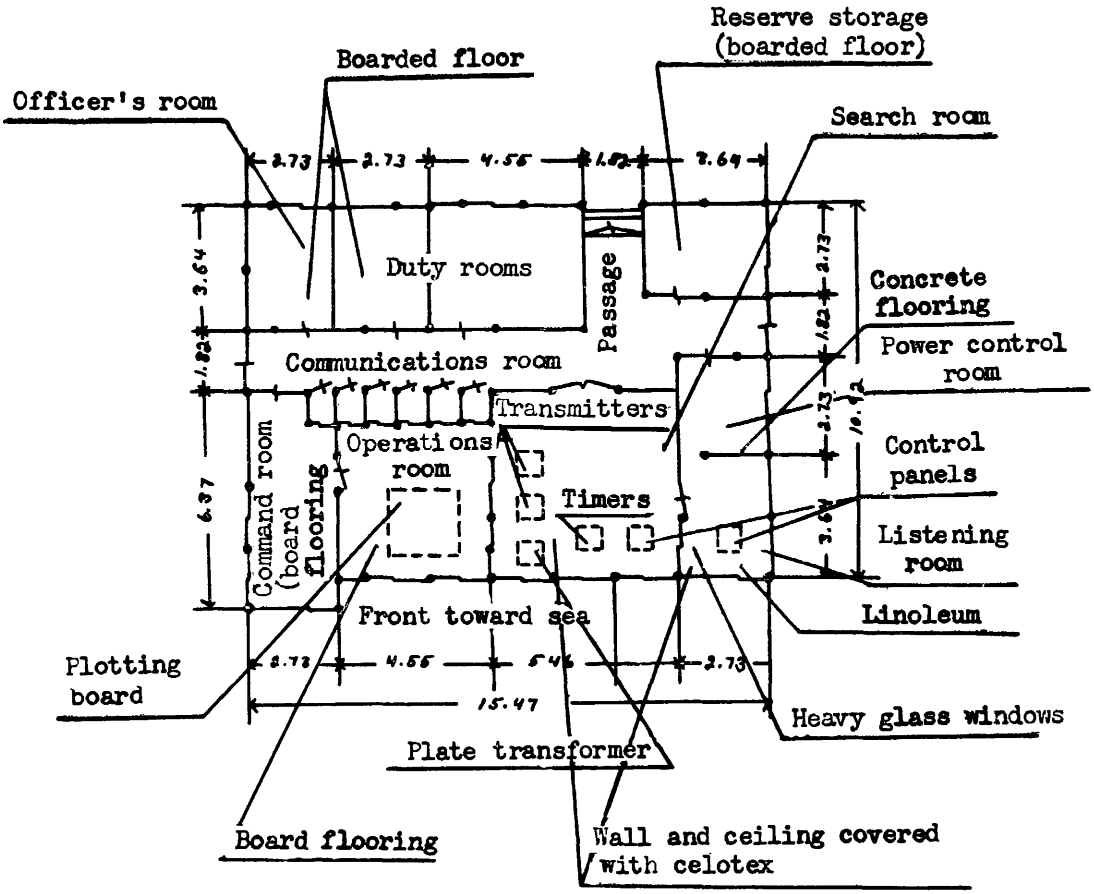
XXII - UNDERWATER-SOUND DETECTION STATION

AREA PLAN



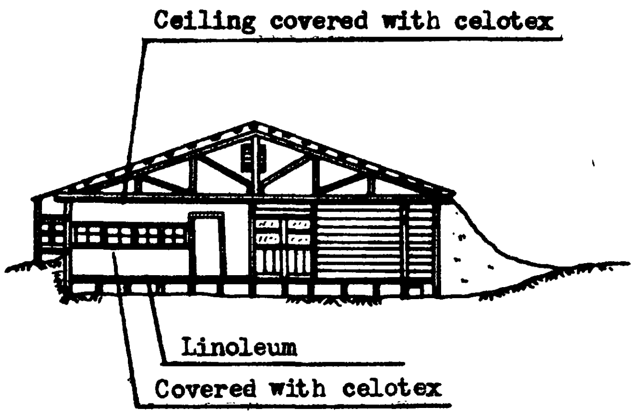
XXII - UNDERWATER-SOUND DETECTION STATION

PLAN CROSS SECTION

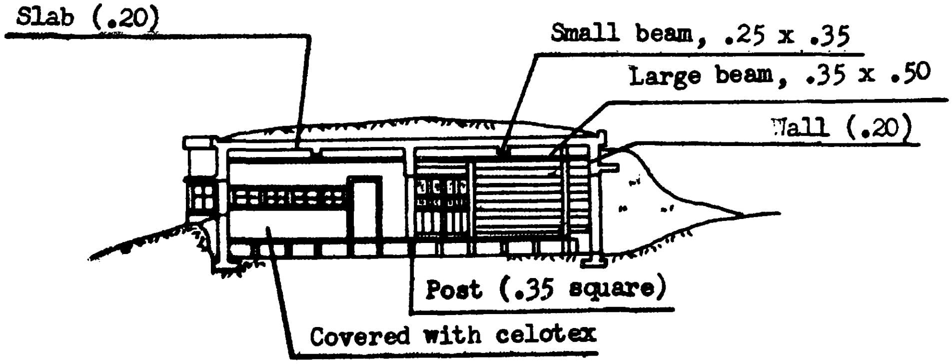


XXII - UNDERWATER-SOUND DETECTION STATION

SECTION A-A (Wood Construction)



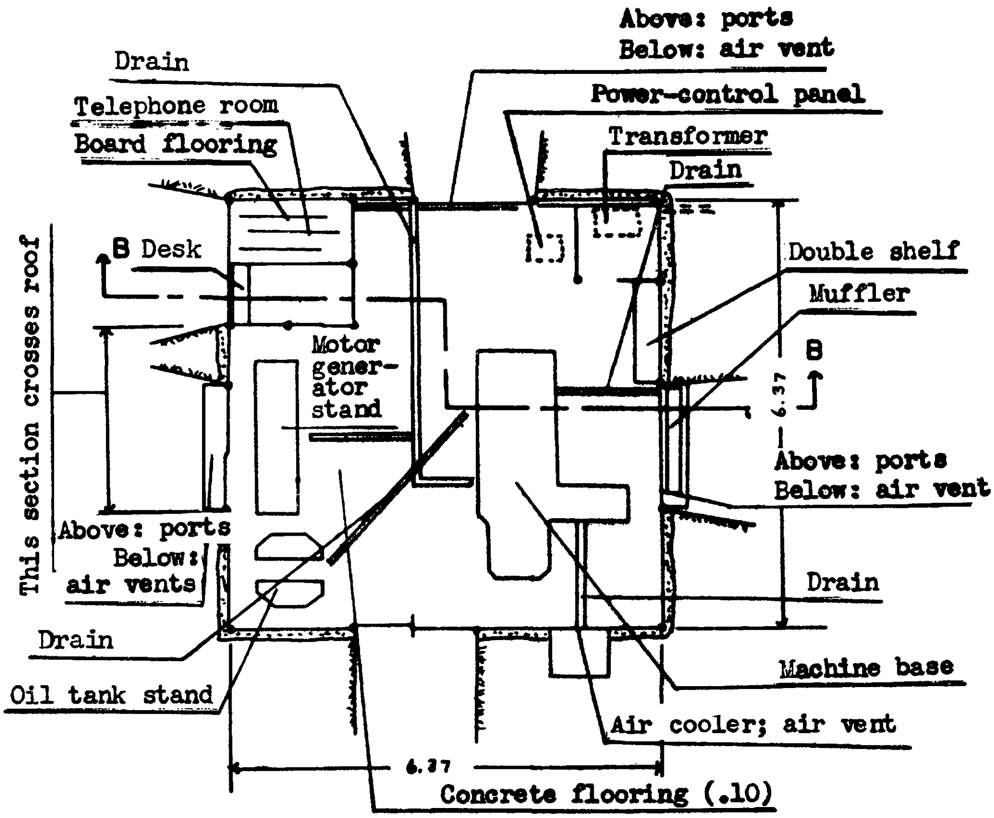
SECTION A-A (Reinforced Concrete Construction)



XXII - UNDERWATER-SOUND DETECTION STATION

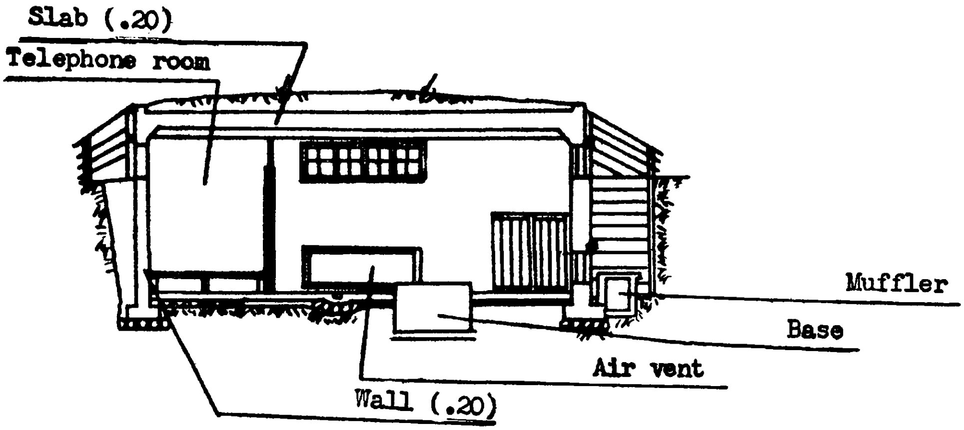
POWER PLANT

PLAN CROSS SECTION

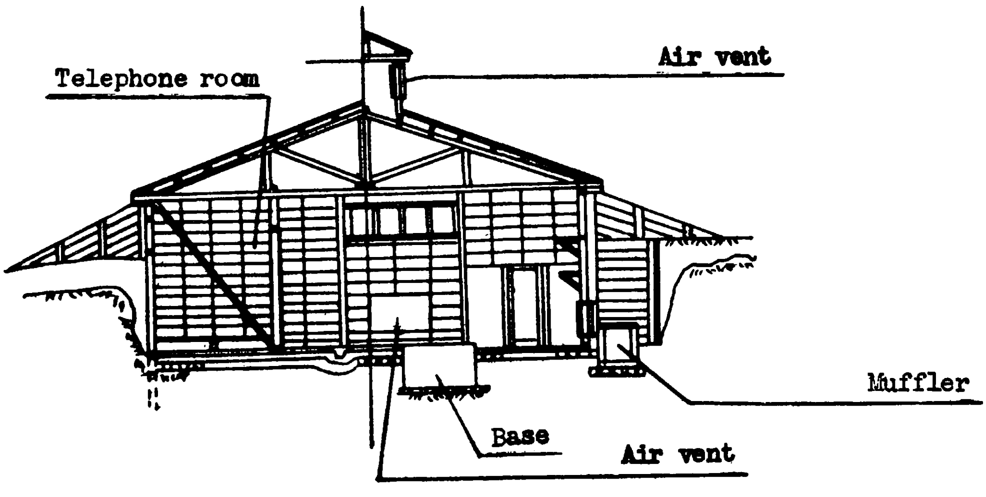


XXII - UNDERWATER-SOUND DETECTION STATION

SECTION B-B (Reinforced concrete Construction)



SECTION B-B (Wooden Construction)

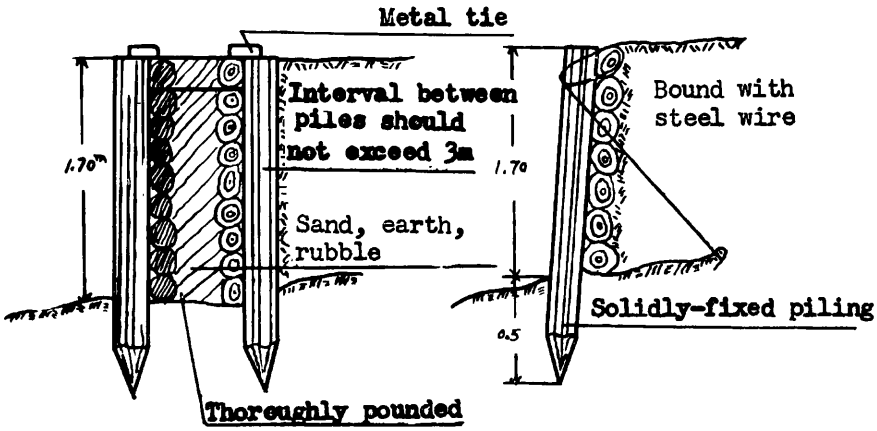


XXIII - BEACH OBSTACLES

LOG-WALL BARRIER

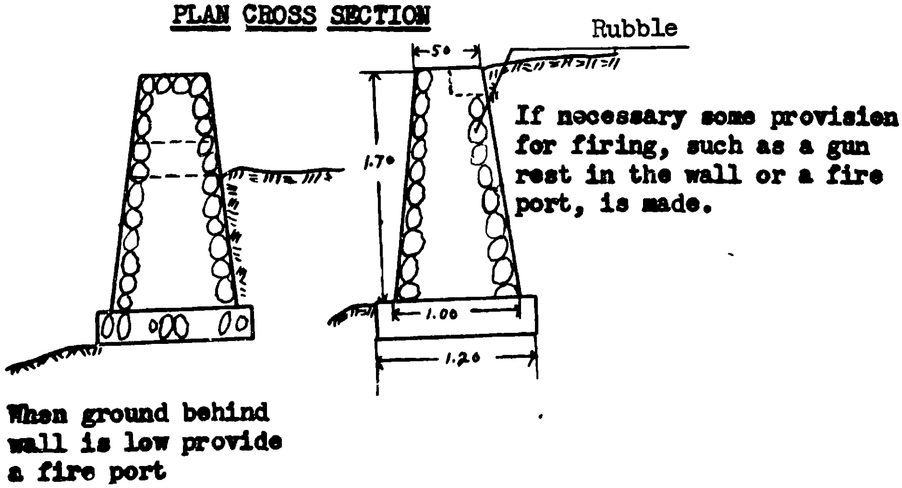
Transverse logs are very closely piled together, and are fastened to vertical stake wherever necessary.

(A) DOUBLE (B) SINGLE



ROCK-WALL BARRIER

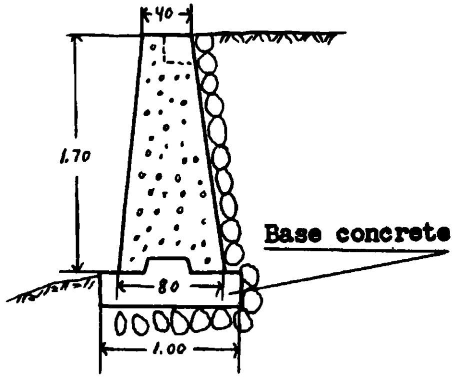
PLAN CROSS SECTION



XXIII - BEACH OBSTACLES

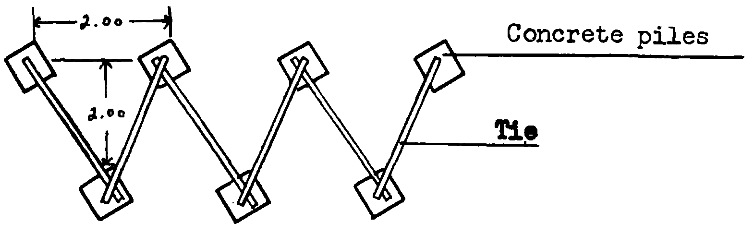
CONCRETE BARRIER

PLAN CROSS SECTION

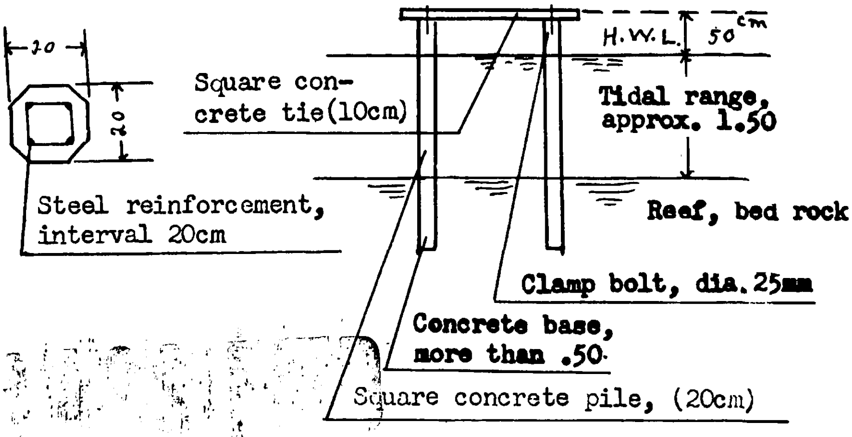


UNDERWATER PALISADE

DIAGRAM OF DISPOSITION



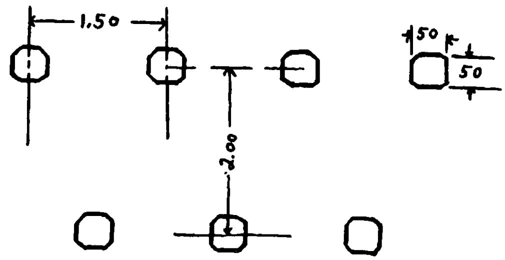
ELEVATION: PILLAR AND TIE



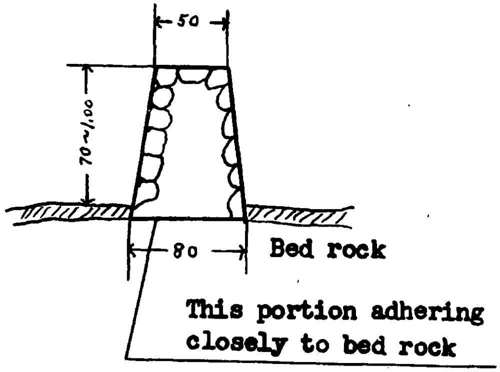
XXIII - BEACH OBSTACLES

RUBBLE BARRIER

DIAGRAM OF DISPOSITION



ELEVATION



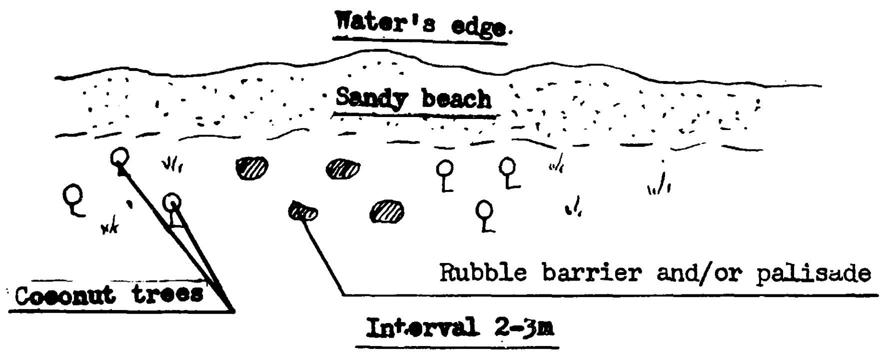
Note: Barriers are dispersed in 2 or more rows.

Note:

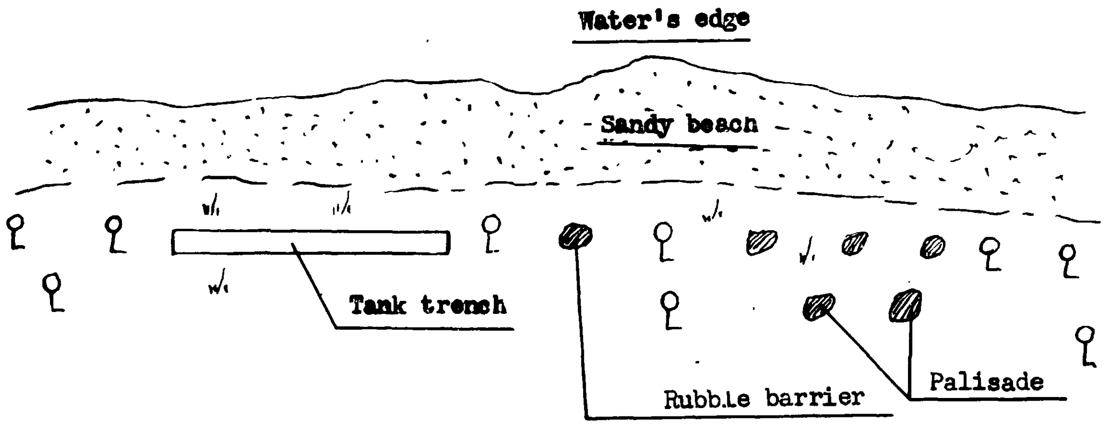
When no rough stone is available on the spot, but gravel is available and concrete can be used, the outer surface is made perpendicular and some convenient square or cylindrical form is used.

XXIII - BEACH OBSTACLES

CONCENTRATIONS OF COCONUT TREES WITH RUBBLE BARRIERS INTERSPERSED



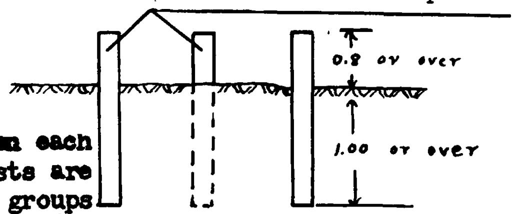
CONCENTRATIONS OF COCONUT TREES WITH /RUBBLE BARRIERS AND/ ANTI-TANK DITCHES INTERSPERSED



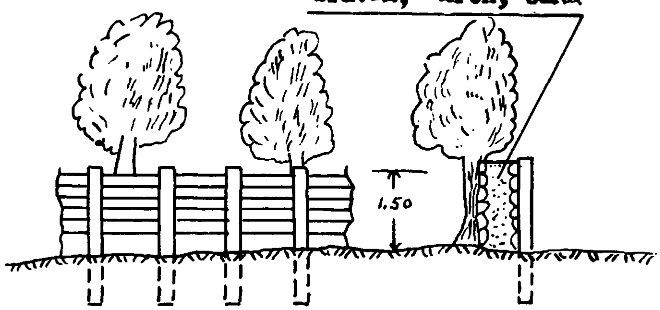
XXIII - BEACH OBSTACLES

PALISADES

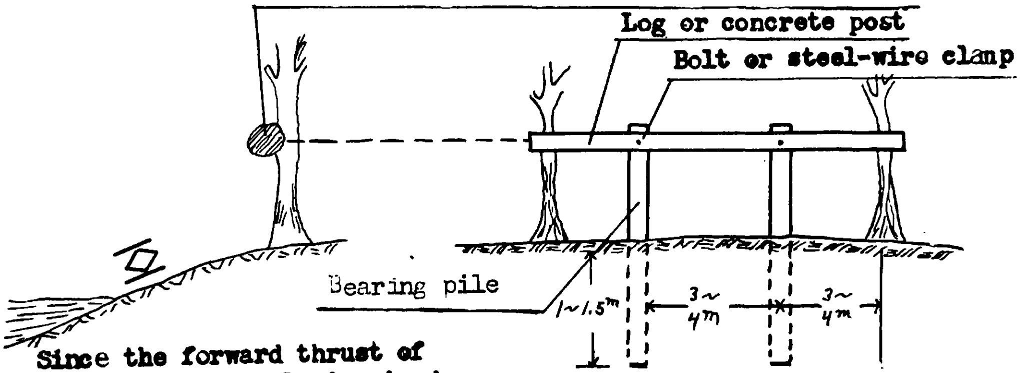
TYPE I



TYPE II



BOOMS



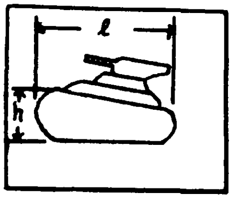
Since the forward thrust of the tank is greatly impaired by sand of the beach and by the slope, it is desirable to plan position of booms so as to utilize these factors.

Diamoter of wooden or concrete post 0.25 or over

In instances where trees are far apart, supporting piles are used.

XXIV - ANTI-TANK OBSTACLES

FORMULA FOR EFFECTIVE ANTI-TANK DITCH



Let:
B = Width at top of ditch
H = Depth of ditch

Then:

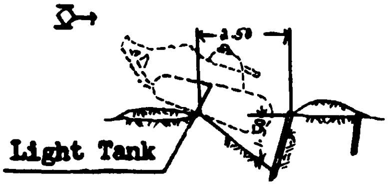
$$B \geq \frac{\ell}{2}$$

$$H > h$$

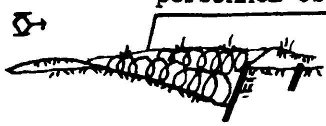
OPEN DITCHES

A - REVETTED TRIANGULAR DITCH

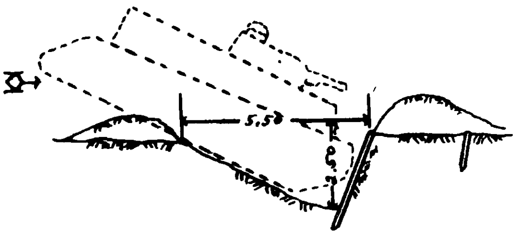
Type I



Type II



Type III

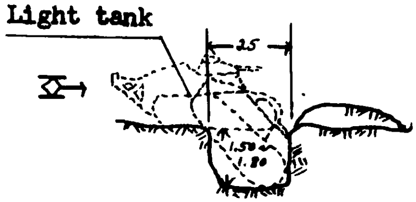


XXIV - ANTI-TANK OBSTACLES

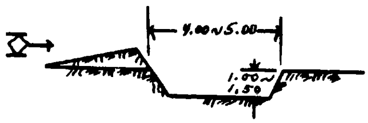
OPEN DITCHES (Continued)

B - NON-REVETTED TRAPEZOIDAL DITCH

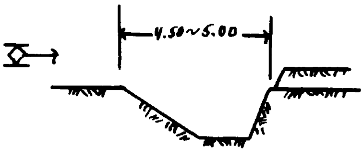
Type I



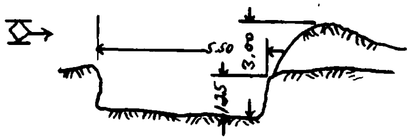
Type II



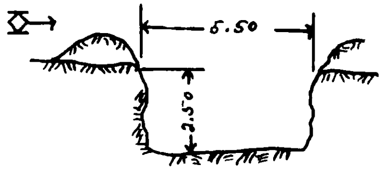
Type III



Type IV



Type V

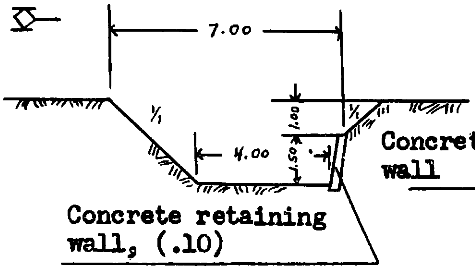


XXIV - ANTI-TANK OBSTACLES

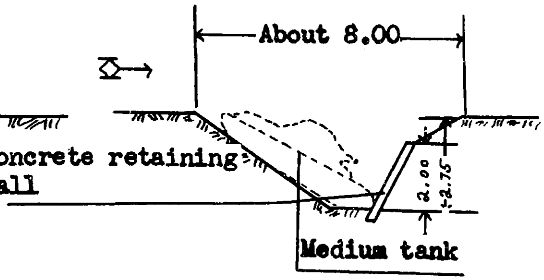
OPEN DITCHES (Continued)

C - REVETTED TRAPEZOIDAL DITCH

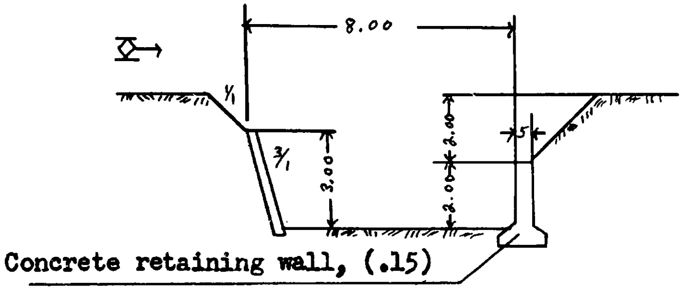
Type I



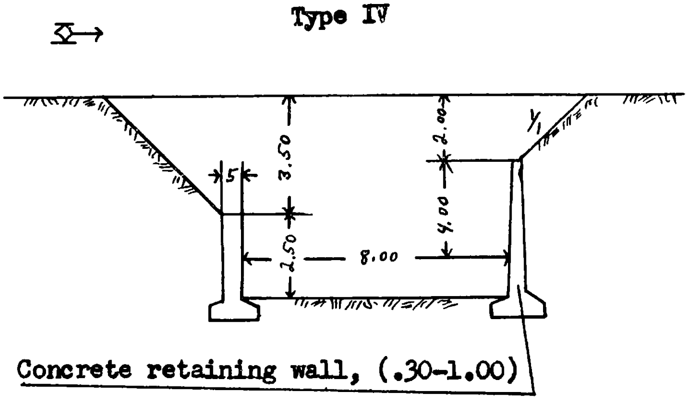
Type II



Type III



Type IV

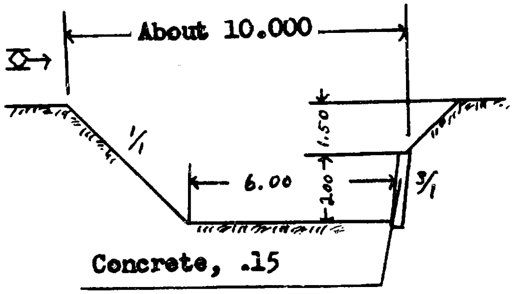


XXIV - ANTI-TANK OBSTACLES

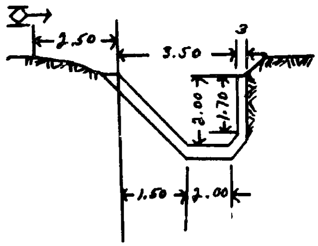
OPEN DITCHES (Continued)

C - REVETTED TRAPEZOIDAL DITCH (Continued)

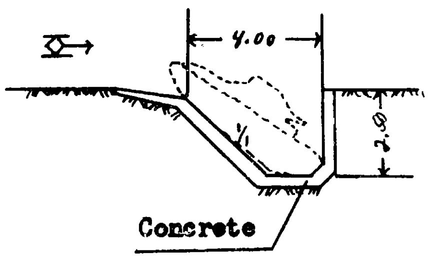
Type V



Type VI



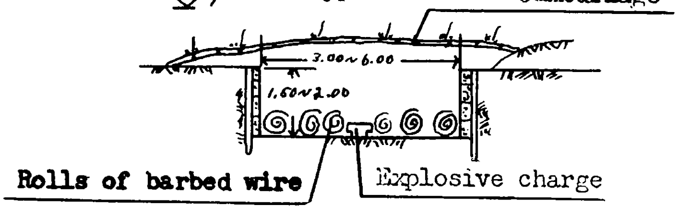
Type VII



XXIV - ANTI-TANK OBSTACLES

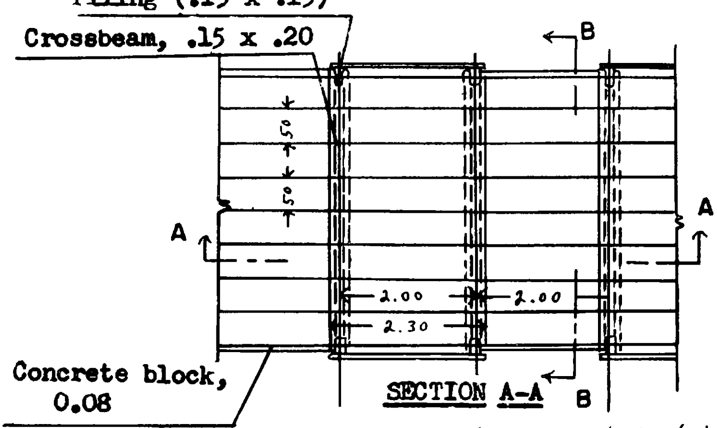
COVERED DITCHES

Type I

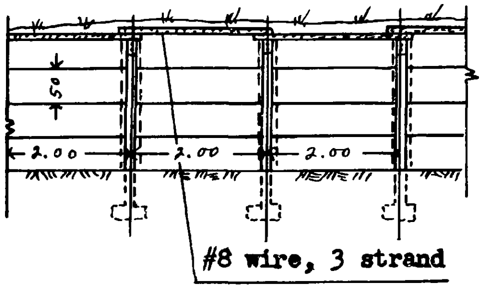


Type II

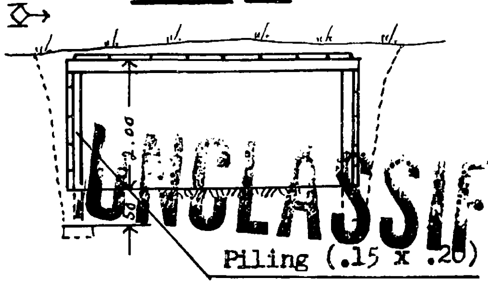
PLAN CROSS SECTION



SECTION A-A

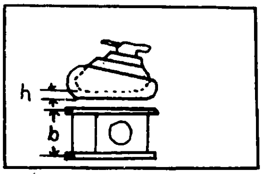


SECTION B-B



XXIV - ANTI-TANK OBSTACLES

FORMULA FOR EFFECTIVE BARRIERS

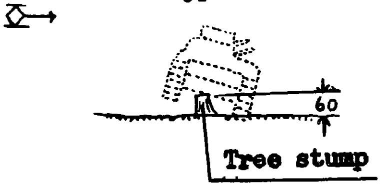


Let:
H = Height of barrier
B = Space between barriers

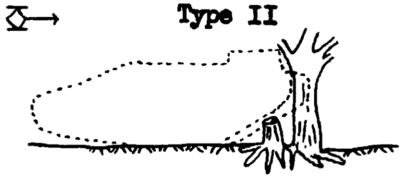
Then:
$H > h$
$B \leq b$

ABATIS

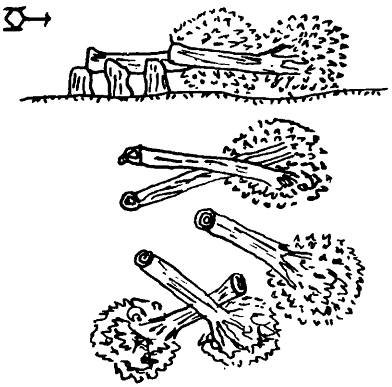
Type I



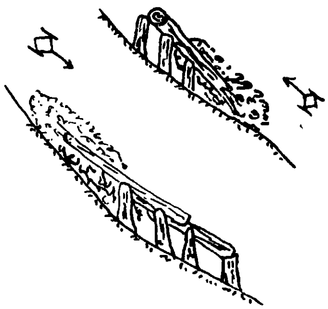
Type II



Type III



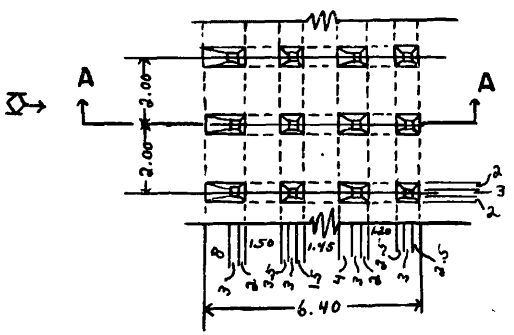
Type IV



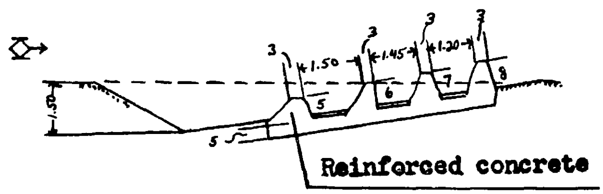
XXIV - ANTI-TANK OBSTACLES

DRAGON'S TEETH

PLAN CROSS SECTION



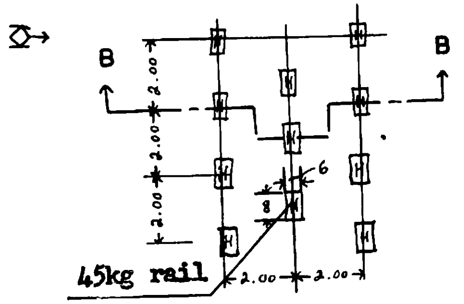
SECTION A-A



XXIV - ANTI-TANK OBSTACLES

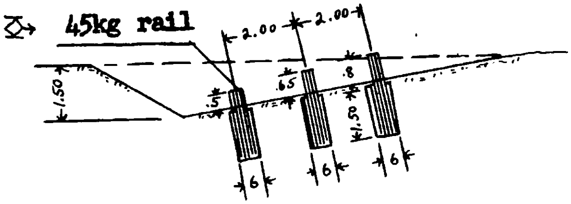
RAIL FIELD

PLAN CROSS SECTION

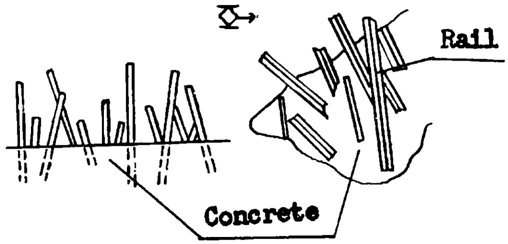


Type I

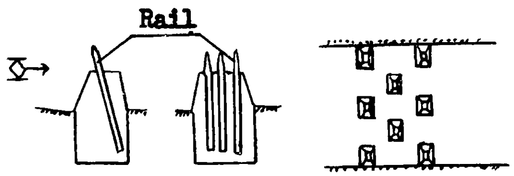
SECTION B-B



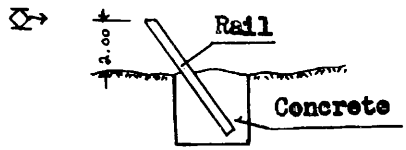
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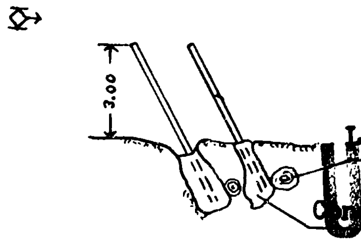
Type III



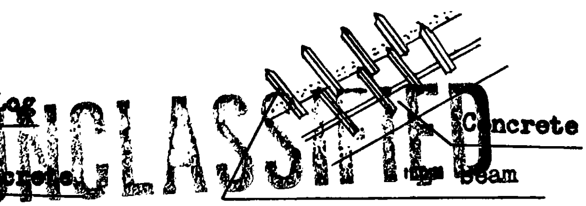
Type IV



Type V



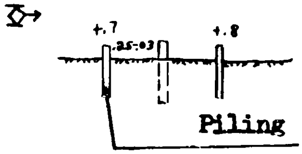
Type VI



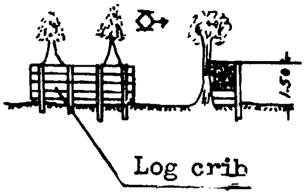
XXIV - ANTI-TANK OBSTACLES

PALISADE

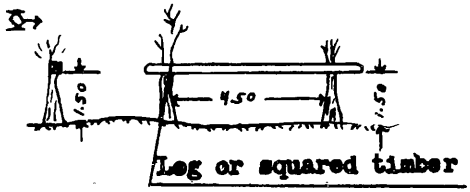
Type I



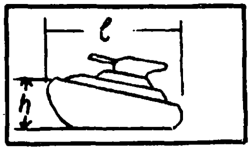
Type II



Type III



XXIV - ANTI-TANK OBSTACLES

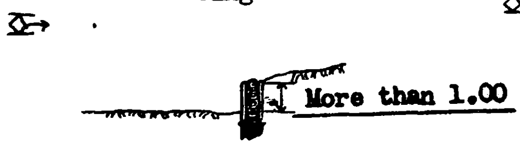


Let H = perpendicular height of barrier

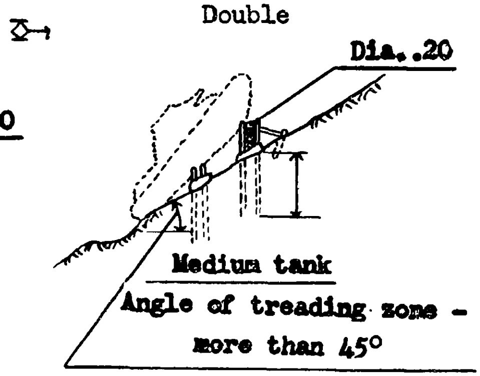
Then H > h

LOG-WALL BARRIERS

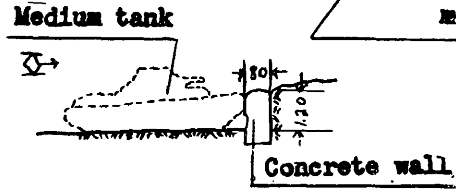
Type I
Single



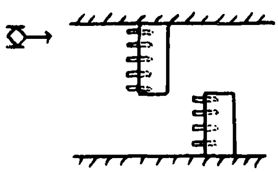
Type II
Double



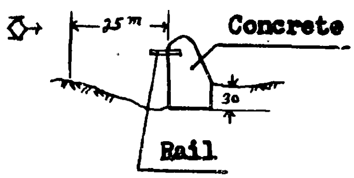
Type III



PLAN VIEW

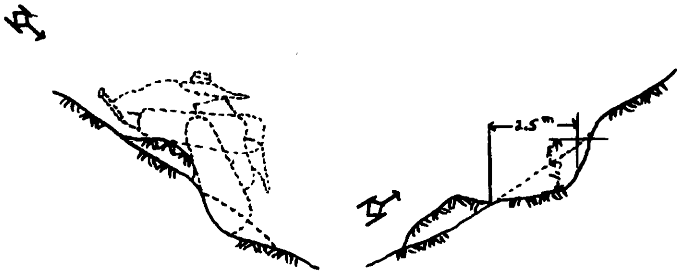


Type IV
SIDE VIEW

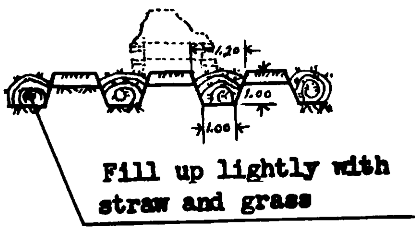


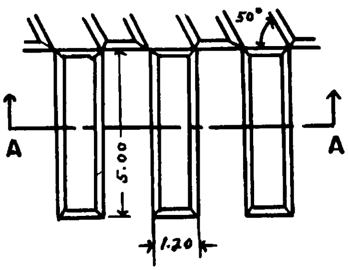
XXIV - ANTI-TANK OBSTACLES

SIDEHILL CUTS



PITS

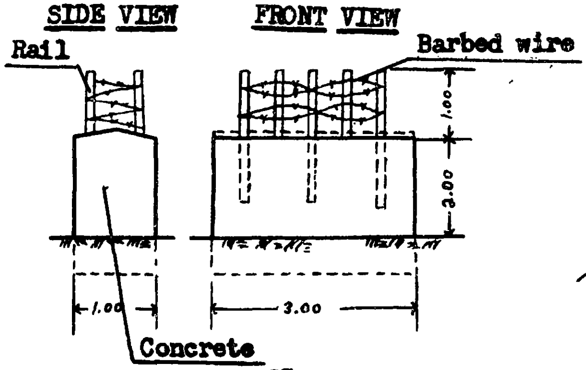


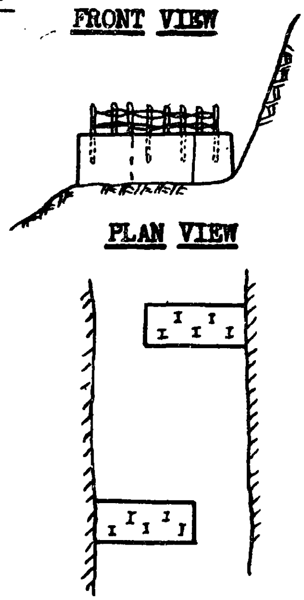


XXIV. ANTI-TANK OBSTACLES

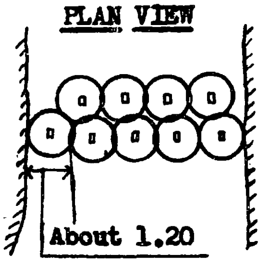
ROAD BLOCKS

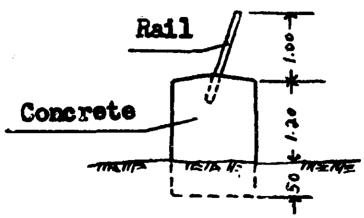
Type I



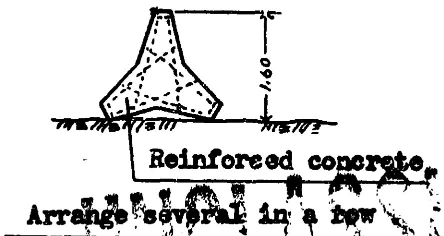


Type II



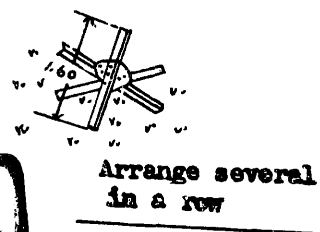


Type III



Type IV

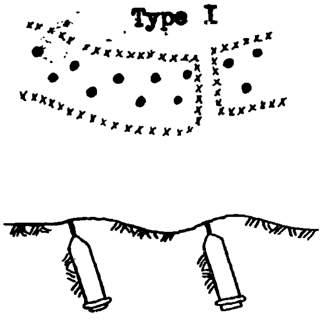
HEDGEHOG



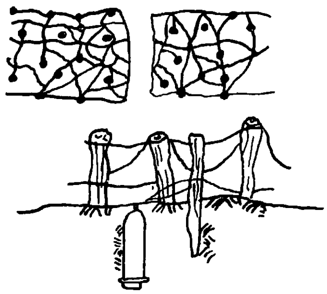
XXIV - ANTI-TANK OBSTACLES

LAND MINE (USING SHELL)

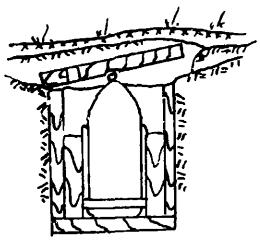
Type I



Type II



Type III

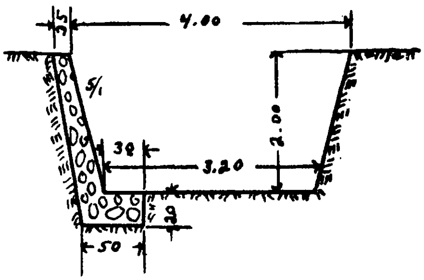


XXIV - ANTI-TANK OBSTACLES

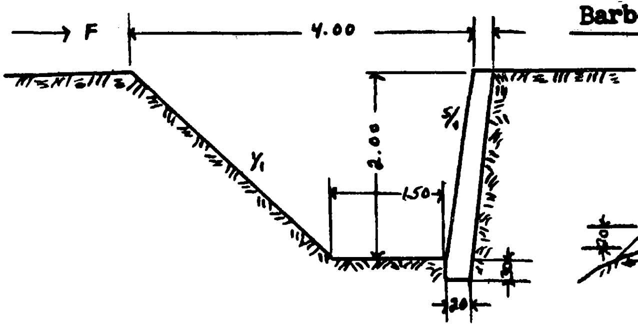
PERMANENT BARRIERS

A - REVETTED OPEN DITCH

TYPE I

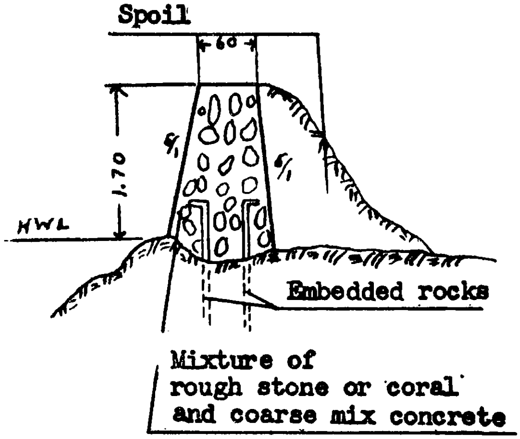


TYPE II

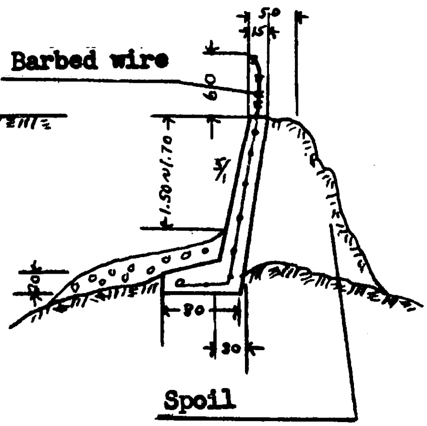


B - ROCK-WALL BARRIER

TYPE I



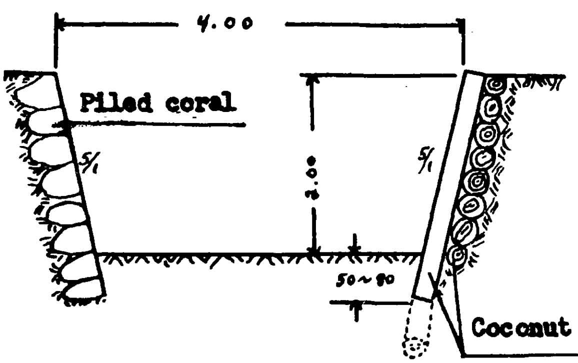
TYPE II



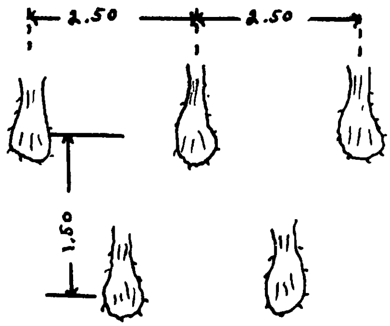
XXIV - ANTI-TANK OBSTACLES

IMPROVISED BARRIERS

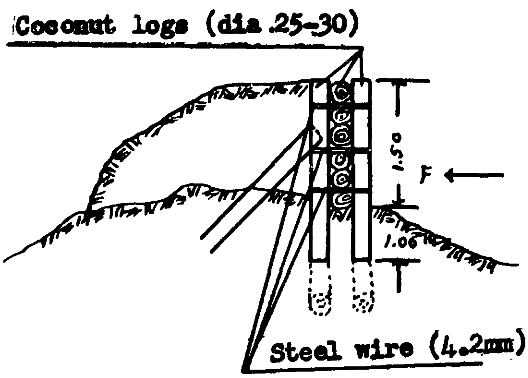
A - REVETTED OPEN DITCH



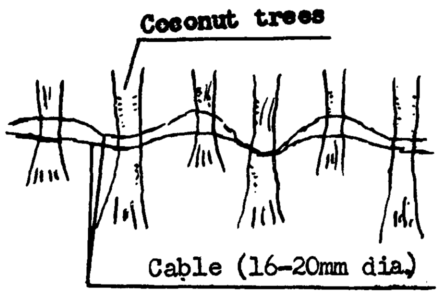
B - COCONUT TREE STUMPS



C - LOG-WALL BARRIER

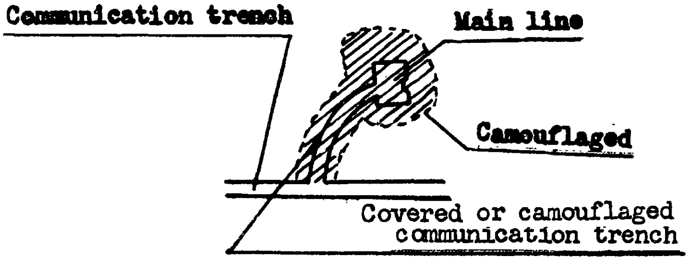


D - CABLE

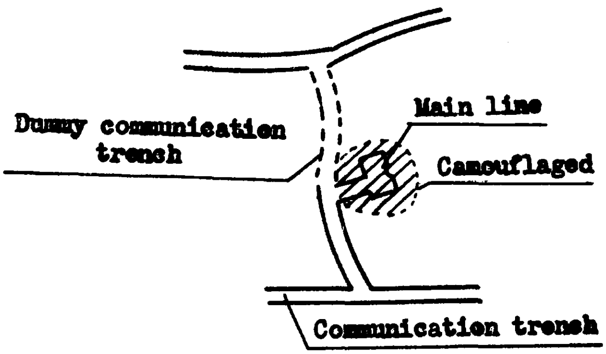


XXV - CAMOUFLAGE

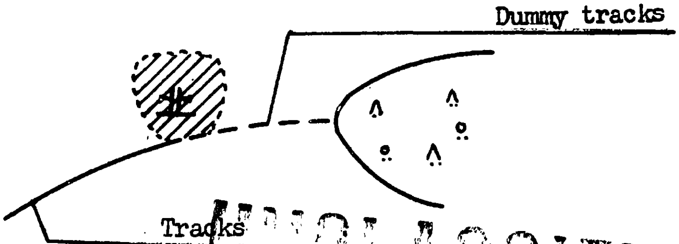
FOR PILLBOX AND COMMUNICATION TRENCH



DUMMY COMMUNICATION TRENCH

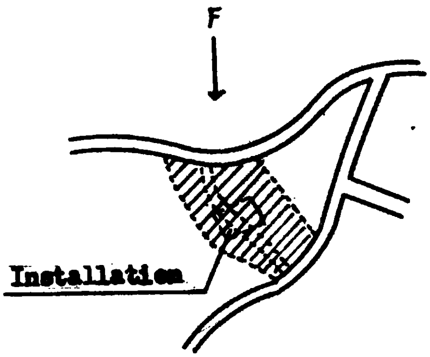


DUMMY ARTILLERY TRACKS

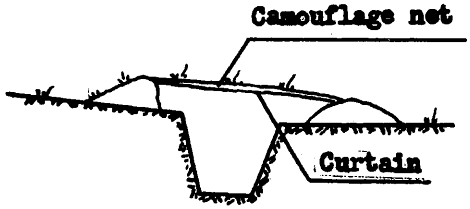


XXV - CAMOUFLAGE

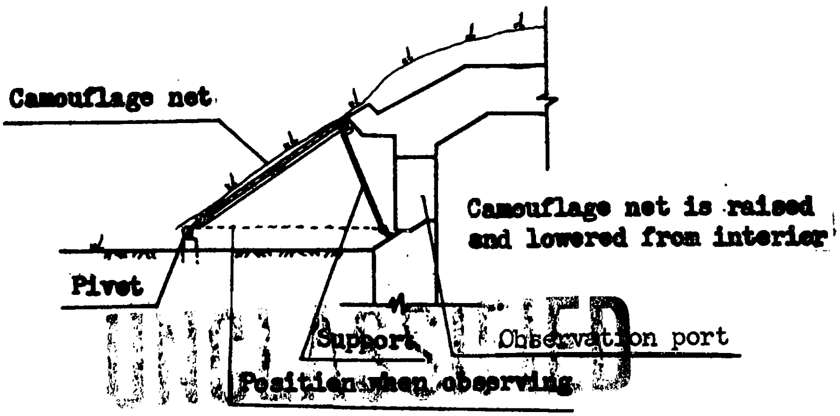
FOR INSTALLATION AND COMMUNICATION TRENCH



FOR TRENCH

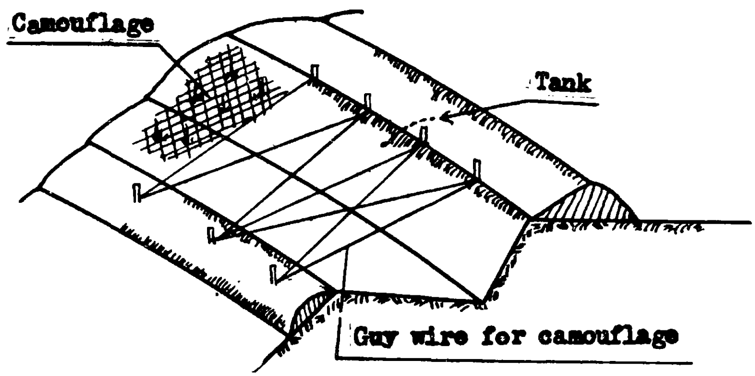


FOR OBSERVATION AND FIRE PORT

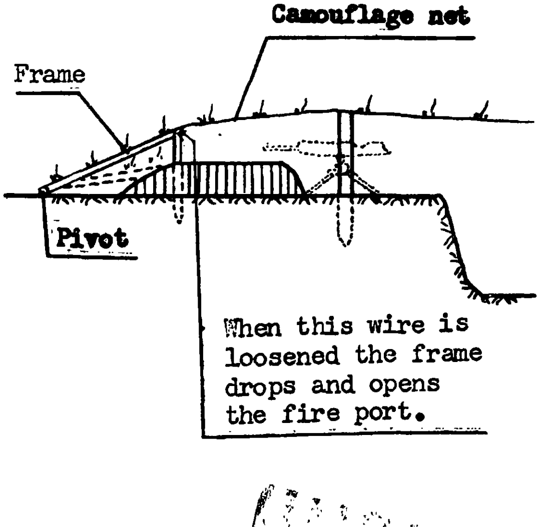


XXV - CAMOUFLAGE

FOR ANTI-TANK CUTS

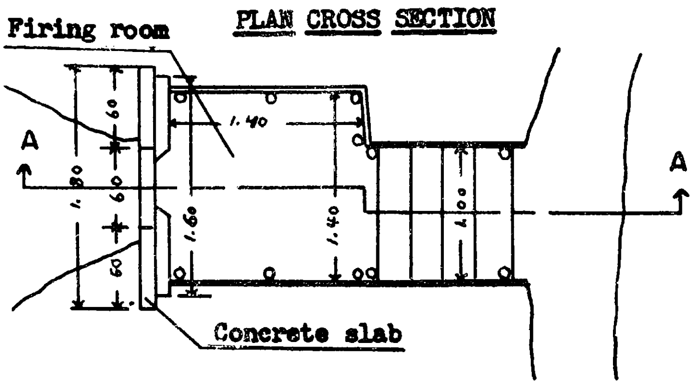


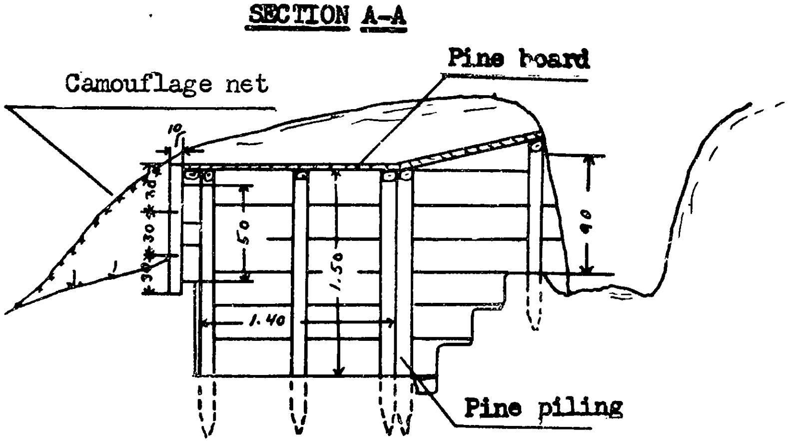
FOR MG FIRE PORT



XXV - CAMOUFLAGE

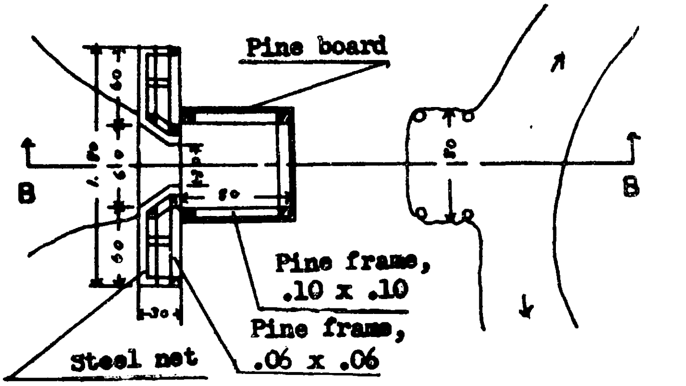
DUMMY FIRE PORT FOR LIGHT SHELTER CAPABLE OF FIRE



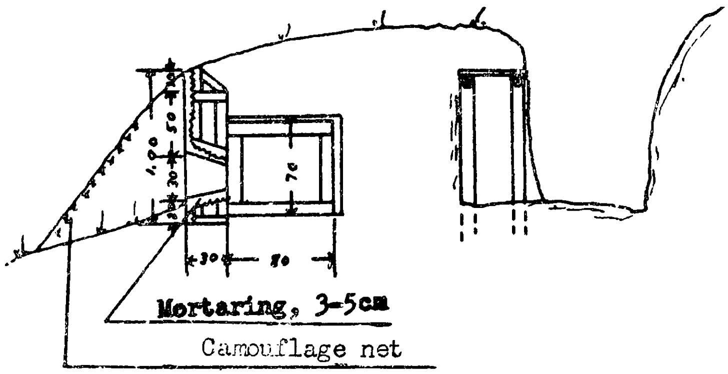


DUMMY FIRE PORT FOR LIGHT SHELTER (Continued)
INCAPABLE OF FIRE

PLAN CROSS SECTION

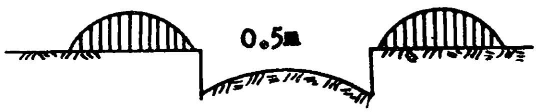


SECTION B-B



XXV - CAMOUFLAGE

DUMMY TRENCH



Light Shelter - Capable of Fire

1. The front wall, as indicated, is made of concrete slabs which are fitted together after being transported to the spot.

Width	Thickness	Length	Number
30cm	10cm	1.8m	2
30cm	10cm	.60m	2
60cm	10cm	1.6m	1 (a 20 x 30cm port is constructed in the center)

2. If necessary, the supports for the firing room and entrance walls are not driven in but are fitted together in short frames.

3. If necessary, the entrance staircase may have a simple revetment.

4. Construction of entrances should take into account factors of local terrain.

Light Shelter - Incapable of Fire

1. The front wall as indicated in the diagram is made out of wood and the part which is exposed above ground and vegetation is of mortar.

2. The entrance may be omitted.

Dummy Trench

1. The width of the trench should be the same as a real one and no greater.

2. The depth of the trench should be at least 50cm, and in cases where there is insufficient time, make the bottom convex in shape.

3. Make the slope steep on both sides.

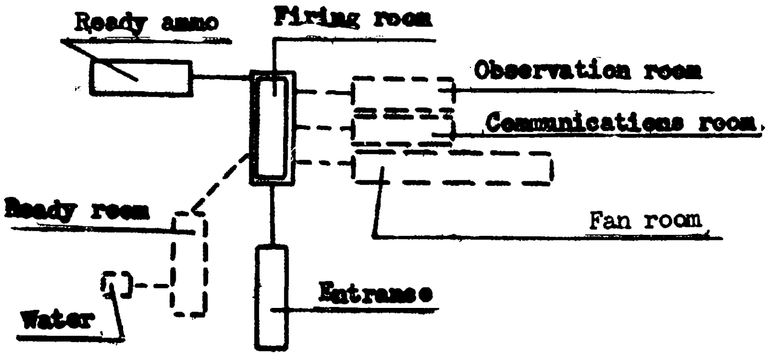
4. Supplement the deficiency in depth by endeavoring to lessen the berm and by giving the remblai a triangular cross section.

5. A communication trench should measure more than 1.2m from top to center, and an anti-tank ditch more than 3m.

XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR LMG, HMG, ANTI-TANK GUN, REGIMENTAL GUN, MOUNTAIN GUN AND FIELD GUN

A - ORGANIZATION OF COMPONENTS



Notes:

1. In the case of Light and Heavy MG, use part of firing room for ammo.

2. Ready Room, Fan Room, etc., need not be constructed separately; one side of firing room or of passageway may be allocated for folding benches and bunks.

3. The Observation Room may be separated from the casemate; and, when conditions warrant, a small port provided for observing enemy movements from within the casemate.

4. Often when a casemate is completely isolated, living quarters and provisions storage are provided.

5. When a casemate is to be used also as a ready shelter, it is designed as a ready shelter.

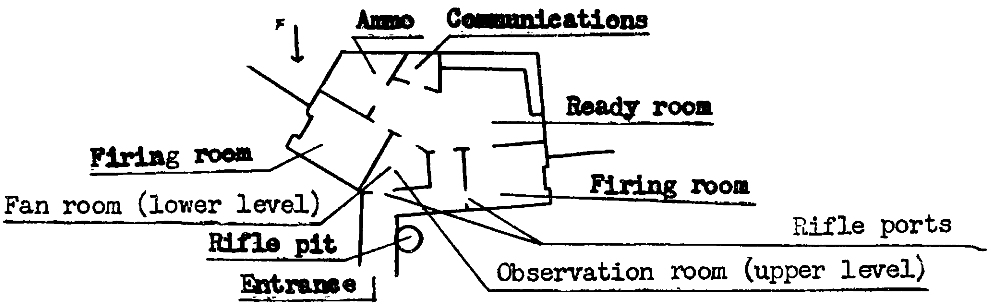
6. The Observation Room may be constructed either for direct view or for use of periscope.

XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

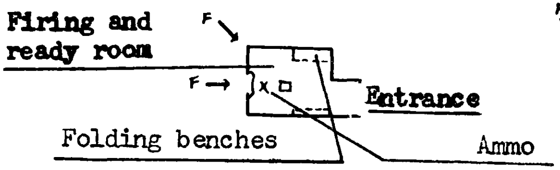
EMPLACEMENTS FOR LMG, HMG, ANTI-TANK GUN, REGIMENTAL GUN, MOUNTAIN GUN AND FIELD GUN (Continued)

B - LAYOUTS OF CASEMATED EMPLACEMENTS FOR LMG AND HMG

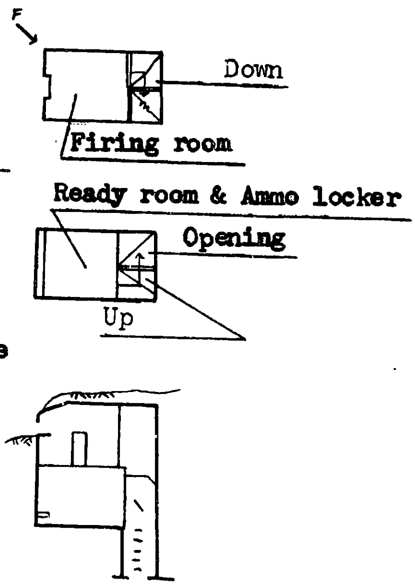
SMALL COVERING POSITIONS



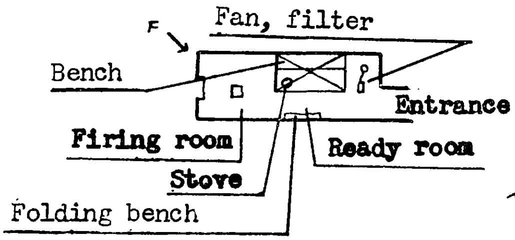
1 GUN (TYPE I)

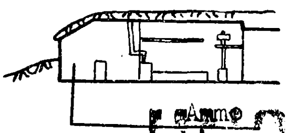


1 GUN (2 LEVELS)



1 GUN (TYPE II)



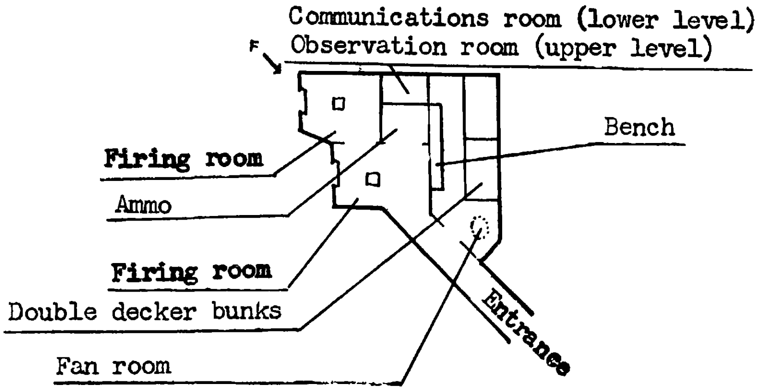


XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

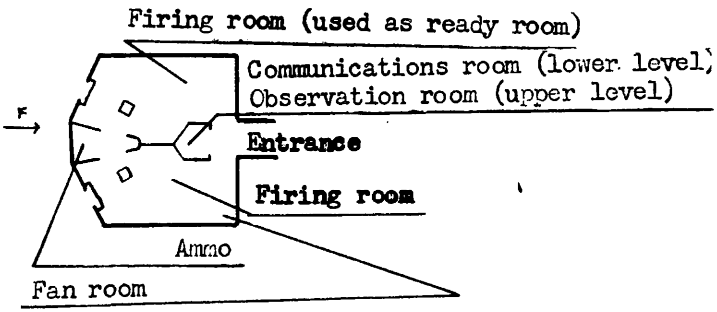
EMPLACEMENTS FOR LMG, HMG, ANTI-TANK GUN, REGIMENTAL GUN, MOUNTAIN GUN AND FIELD GUN (Continued)

B - LAYOUTS OF CASEMATED EMPLACEMENTS FOR LMG AND HMG (Continued)

2 GUNS (FLANK DEFENSE)



2 GUNS (FRONTAL FIRE)



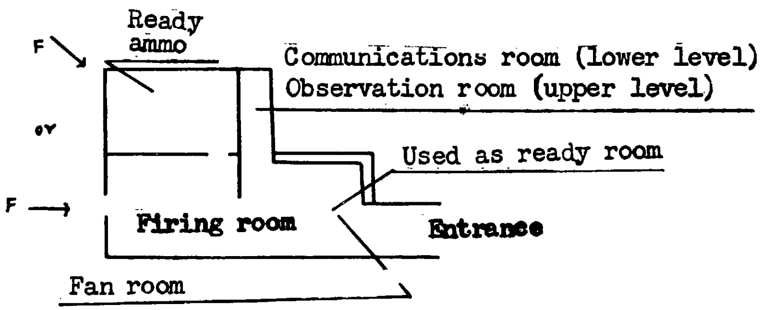
XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR LMG, HMG, ANTI-TANK GUN, REGIMENTAL GUN, MOUNTAIN GUN AND FIELD GUN (Continued)

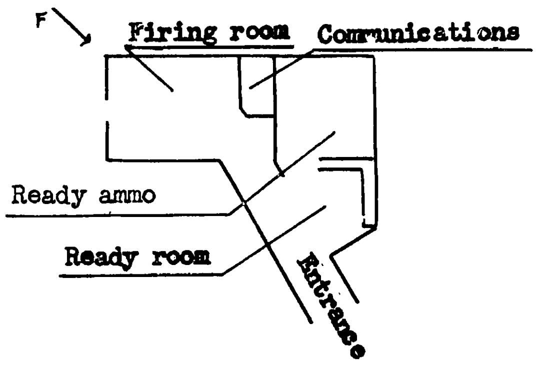
C - LAYOUTS OF CASEMATED EMPLACEMENTS FOR ANTI-TANK, REGIMENTAL, MOUNTAIN AND FIELD GUNS

1. Modeled after the light and heavy MG Casemates.
2. If necessary, a place for gun fittings and repair tools is provided.

1 GUN (FRONTAL FIRE)



1 GUN (FLANK DEFENSE)

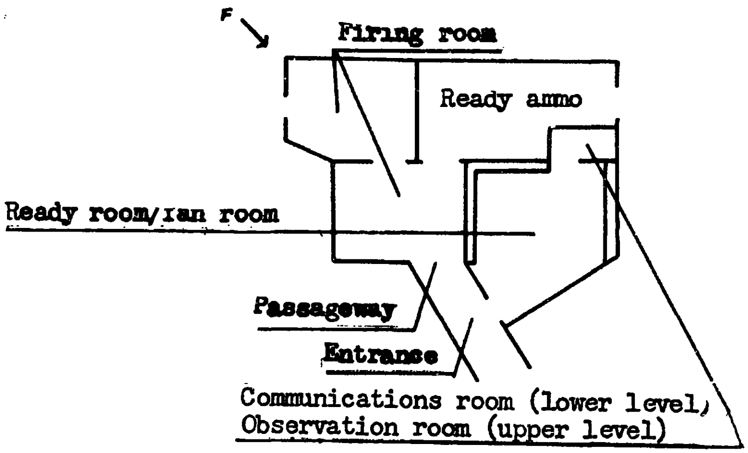


XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

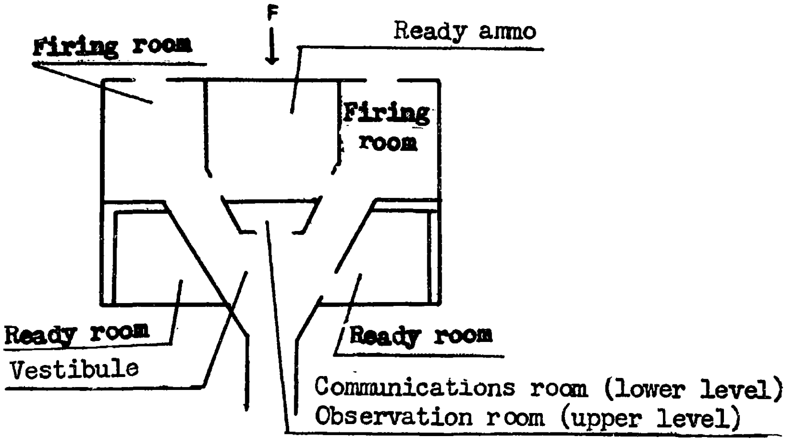
EMPLACEMENTS FOR LMG, HMG, ANTI-TANK GUN, REGIMENTAL GUN, MOUNTAIN GUN AND FIELD GUN (Continued)

C - LAYOUTS OF CASEMATED EMPLACEMENTS FOR ANTI-TANK, REGIMENTAL, MOUNTAIN AND FIELD GUNS (Continued)

2 GUNS (FLANK DEFENSE)



2 GUNS (FRONTAL FIRE)

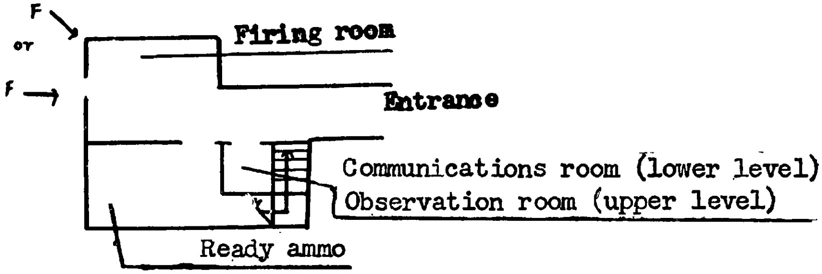


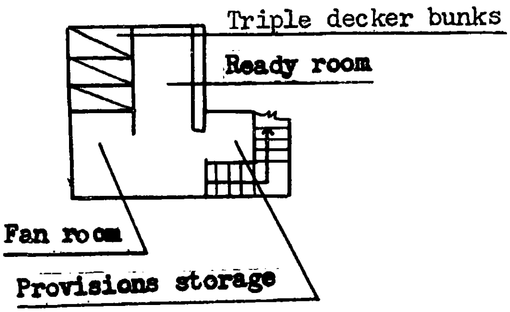
XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR LMG, HMG, ANTI-TANK GUN, REGIMENTAL GUN, MOUNTAIN GUN AND FIELD GUN (Continued)

C - LAYOUTS OF CASEMATED EMPLACEMENTS FOR ANTI-TANK, REGIMENTAL, MOUNTAIN AND FIELD GUNS (Continued)

1 GUN (2 LEVELS)



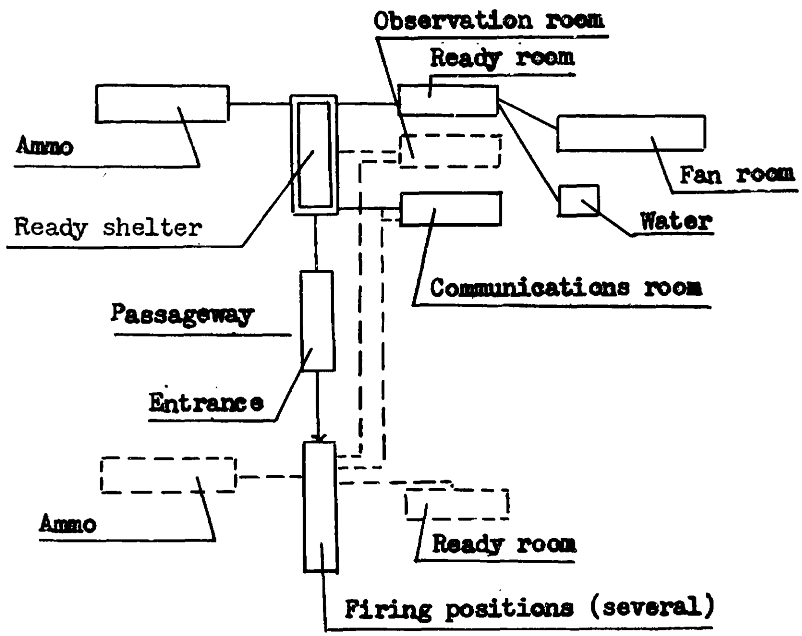


Note: If wheeled gun mounts are used as they are, care must be taken in specifying width and radius of curvature, in order to provide easy entrance and exit. Plans should be so made that an easy change of firing position is possible.

XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR MG AND CANNON

A - ORGANIZATION OF COMPONENTS



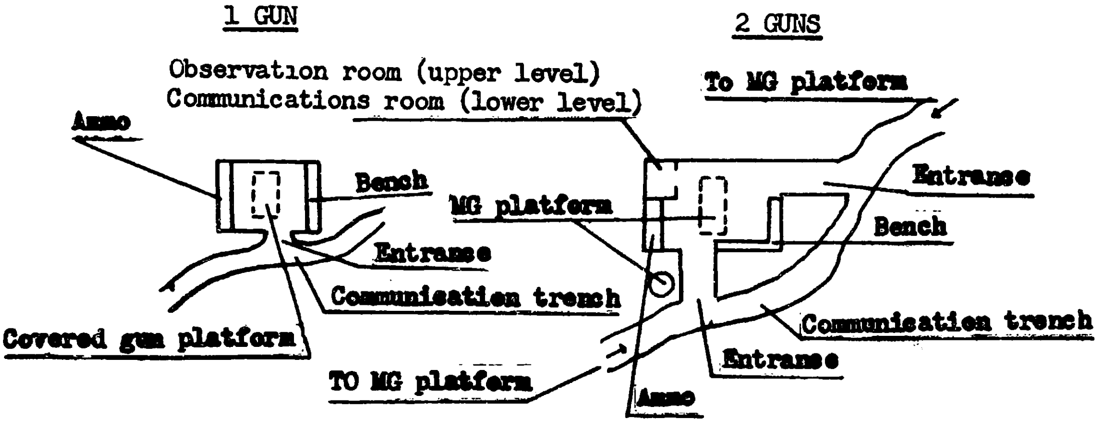
Notes:

1. Ready Shelter is sometimes used as a Firing Room. In this case, layouts conforms to regular casemate.
2. Ammo is either stored close by a ready magazine or at the firing positions.
3. Frequently one side of the Ready Shelter is used for a Ready Room, Communications Room, etc.
4. Frequently the Observation Room is constructed separately in conformance with the regular layout.
5. Revetments and small underground shelters may be constructed at the firing position.
6. Entrance, passageway, and firing position should be completely camouflaged. Sometimes an underground passageway is provided.

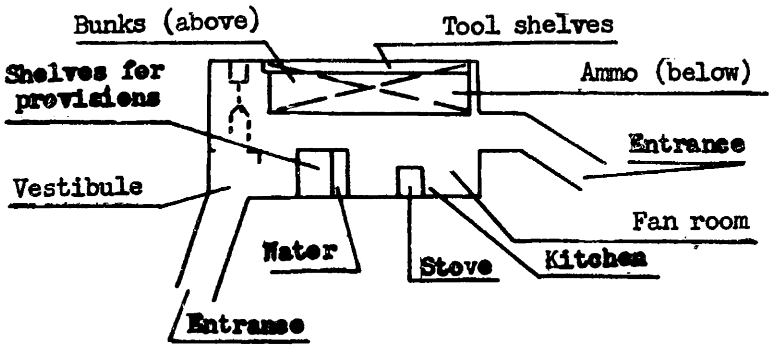
XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR MG AND CANNON (Continued)

B - LAYOUTS OF CASEMATED EMPLACEMENTS FOR MG



USED AS PERSONNEL QUARTERS



Note:

May be used simultaneously as standard O.P. and MG emplacement.

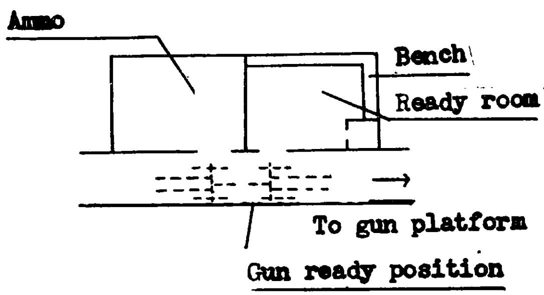
XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR MG AND CANNON (Continued)

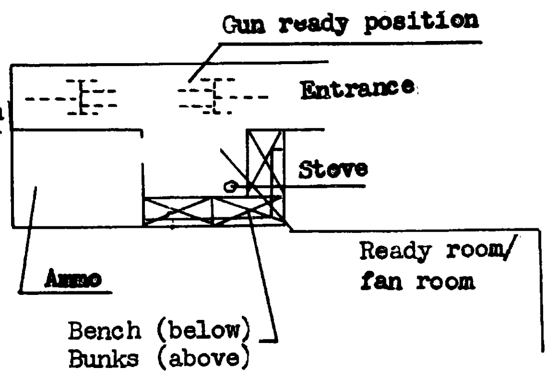
C - LAYOUTS OF CASEMATED EMPLACEMENTS FOR ANTI-TANK, BATTALION, AND FIELD GUNS, MORTARS, 10cm CANNON, 10 & 15cm HOWITZERS

The layout of these emplacements is the same as for Light and Heavy MG. However, when they house large guns, compartments for gun fittings and tractor housing may be provided.

2 GUNS /TYPE I/



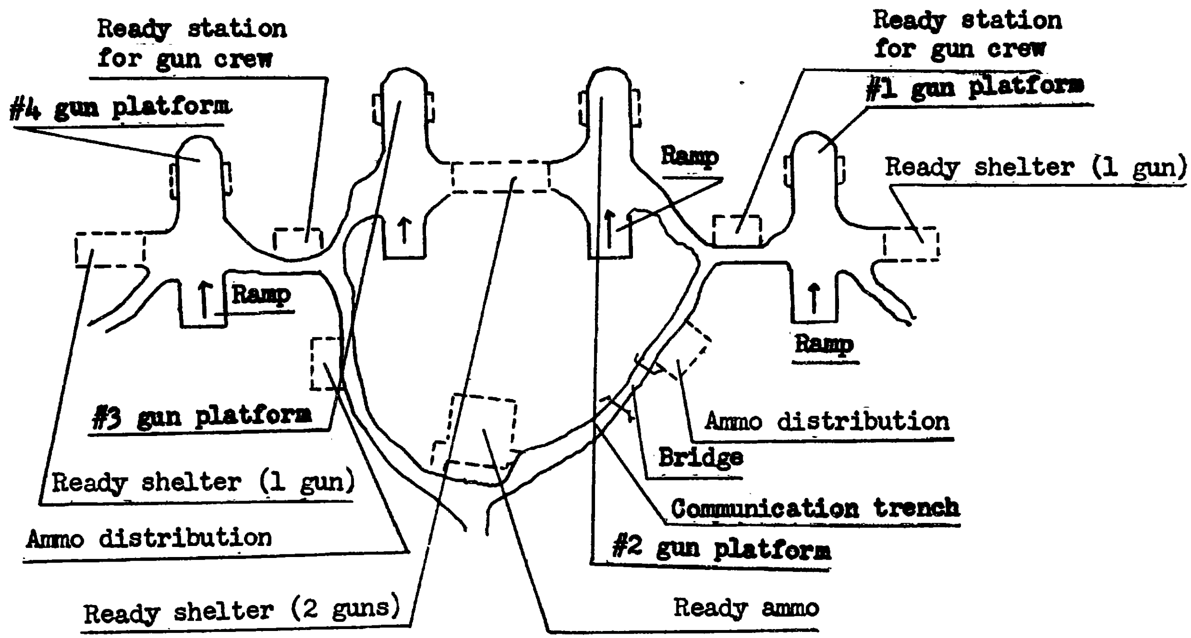
2 GUNS /TYPE II/



XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

EMPLACEMENTS FOR MG AND CANNON (Continued)

D - LAYOUT OF OPEN EMPLACEMENTS FOR 4 GUNS (WITH READY SHELTERS)



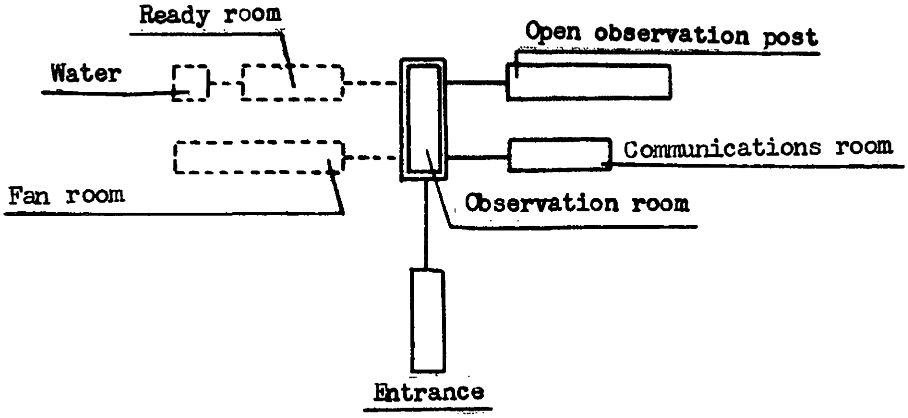
READY SHELTER (1 GUN)



XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

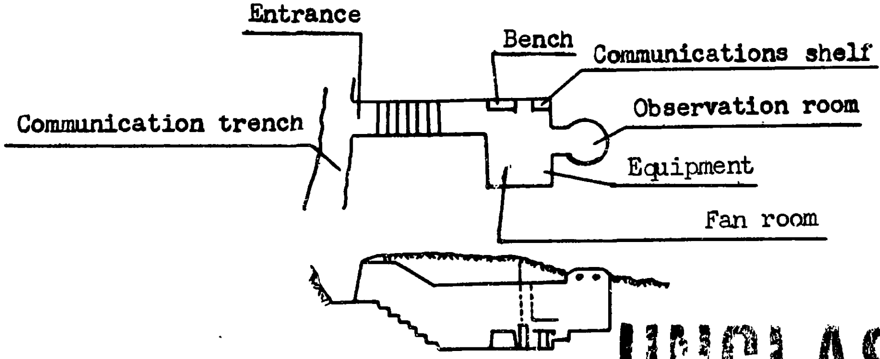
OBSERVATION POST

A - ORGANIZATION OF COMPONENTS



1. O.P.'s vary according to function and instruments housed - that is, there are those for spotting with the naked eye, binoculars, battery telescope, periscope, observation glass, and those for 1 man, 2 men, several men.
2. It is common practice to provide fire pits in the observation room - for defensive purposes.
3. In cases when the O.P. serves also as a gas-detection station or as a command post, it is equipped with the necessary accessories.

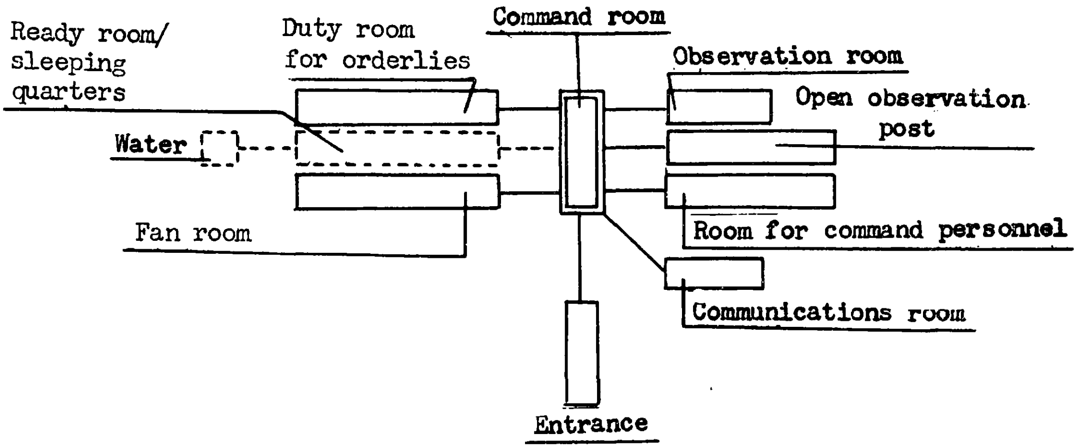
B - LAYOUT



XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

COMMAND POST

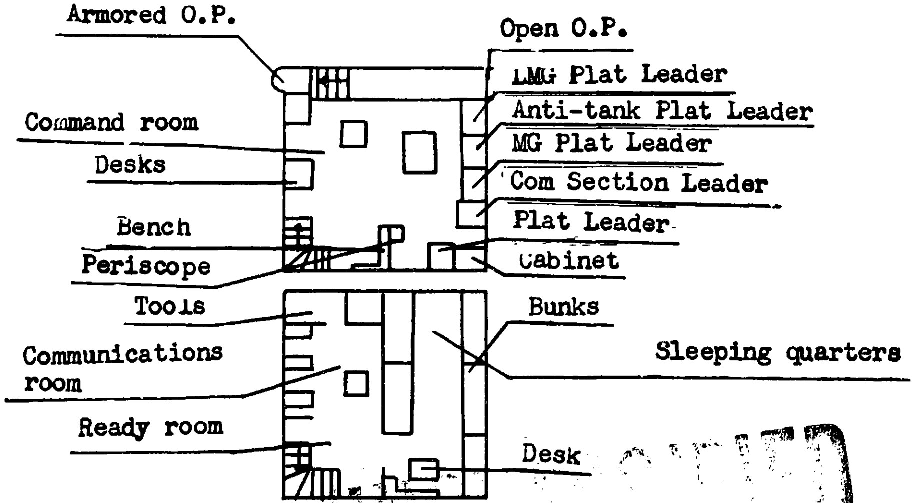
A - ORGANIZATION OF COMPONENTS



1. This diagram shows a C.P. near the front lines; field C.P.'s of higher echelon HQ's in the rear do not follow this pattern.
2. Routine command personnel are assigned to the Command Room.
3. The Communications Room may serve also on occasion as a switchboard room or as a radio room.

B - LAYOUTS OF COMPANY COMMAND POST

2 LEVELS



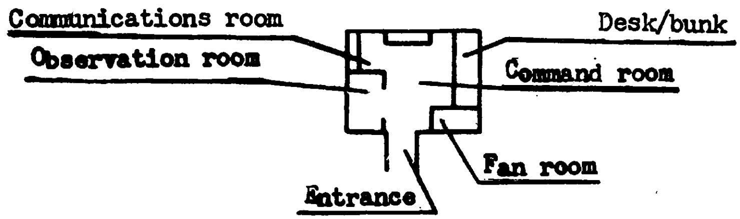
This represents the most highly equipped type; it may be adapted to serve as Bn C.P.

XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

COMMAND POST (Continued)

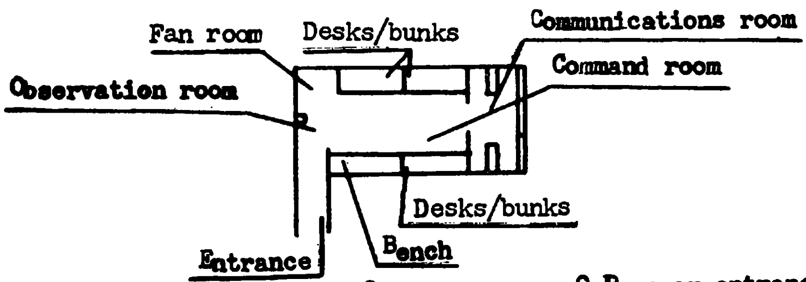
B - LAYOUTS OF COMPANY COMMAND POST (Continued)

1 LEVEL



Set up an open O.P. at entrance

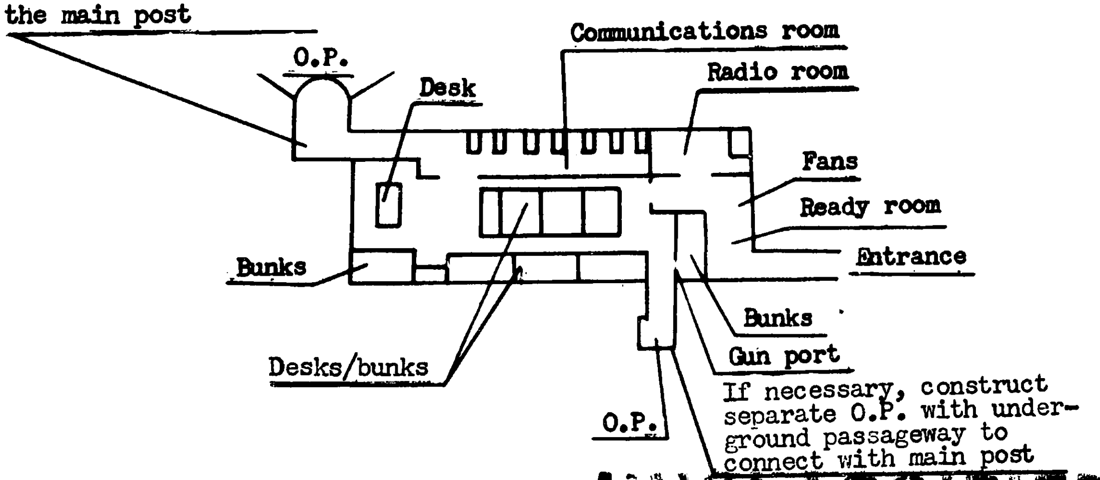
C - LAYOUT OF BATTALION COMMAND POST



Set up an open O.P. near entrance

D - LAYOUT OF COMMAND POST FOR GARRISON/SECTOR UNIT

May in certain terrain, be constructed separate from and in advance of the main post

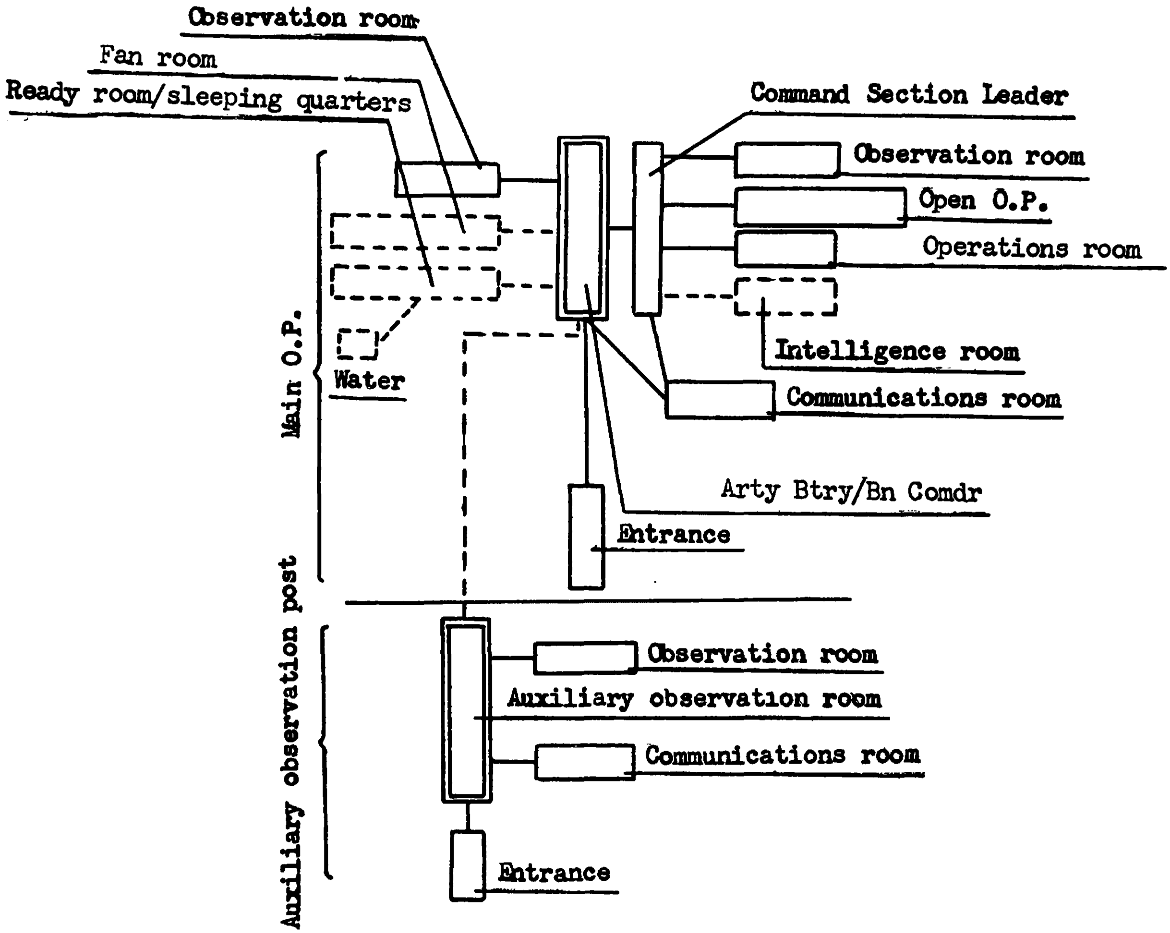


If necessary, construct separate O.P. with underground passageway to connect with main post

XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

ARTILLERY OBSERVATION POST

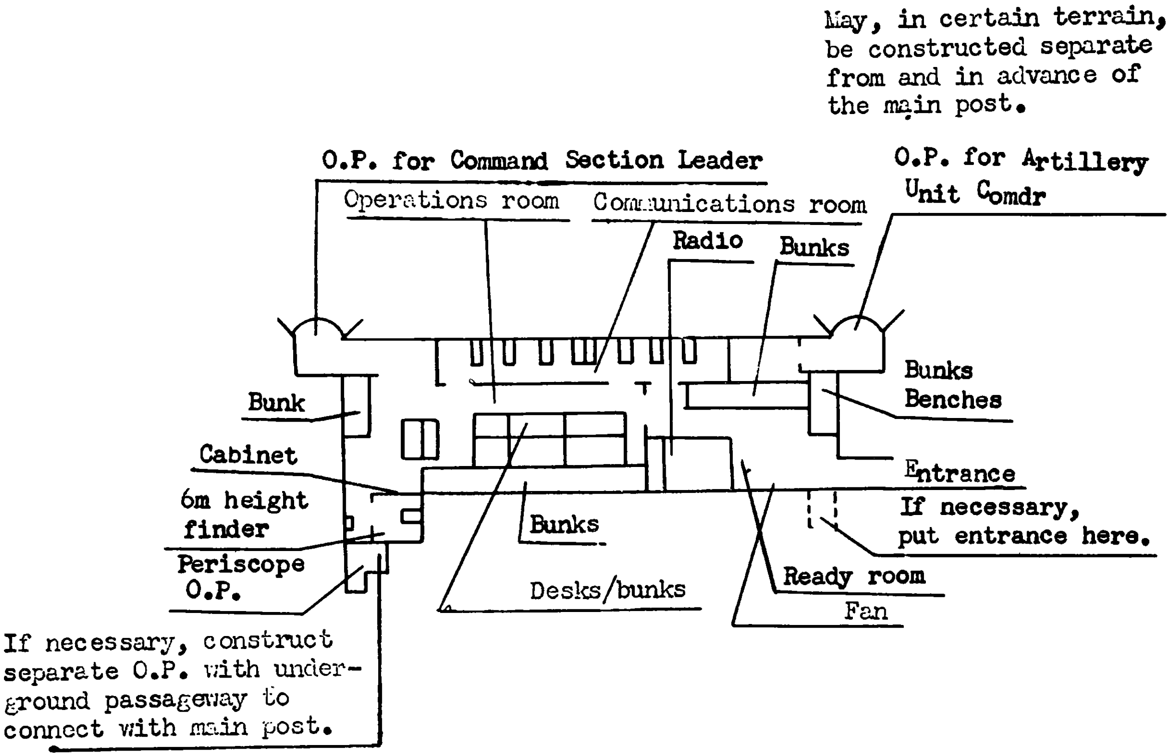
A - ORGANIZATION OF COMPONENTS



XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

ARTILLERY OBSERVATION POST (Continued)

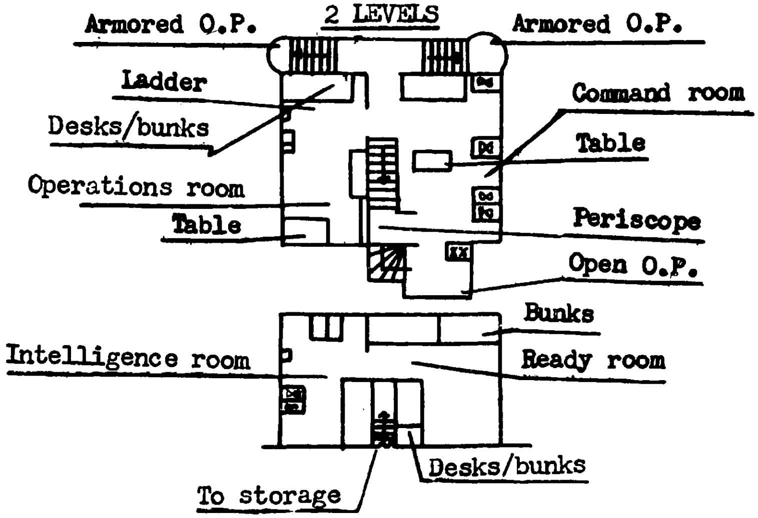
B - LAYOUT OF BATTALION OBSERVATION POST

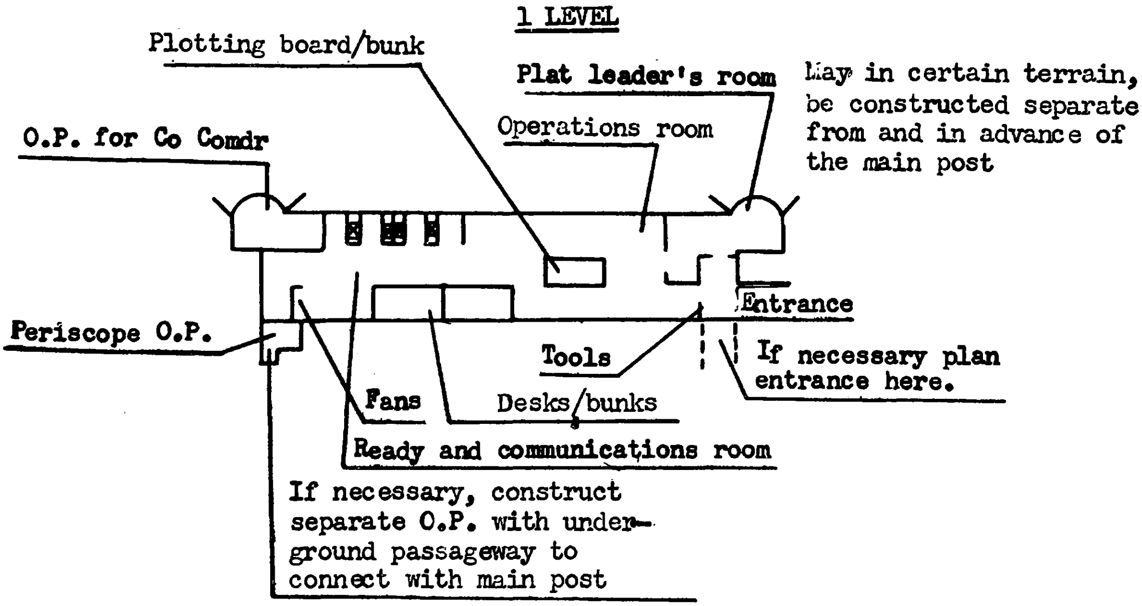


XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

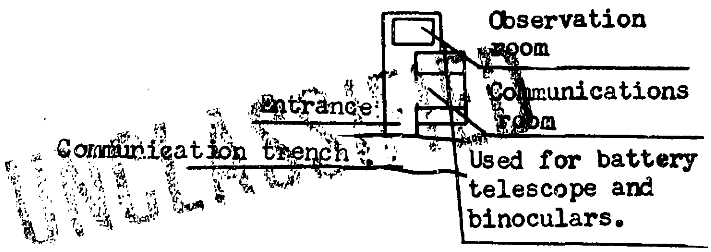
ARTILLERY OBSERVATION POST (Continued)

C - LAYOUTS OF BATTERY OBSERVATION POST





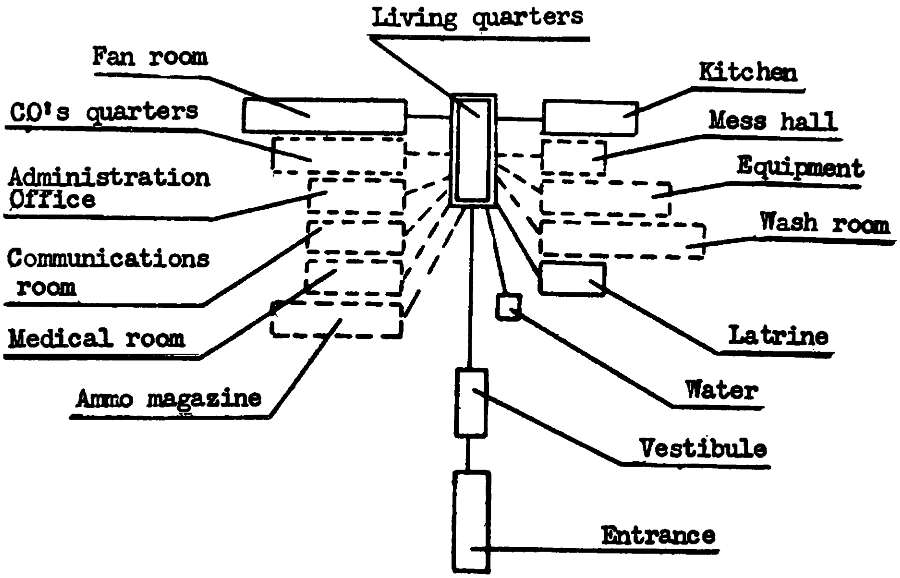
D - LAYOUT OF AUXILIARY OBSERVATION POST



XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

UNDERGROUND SHELTERS FOR PERSONNEL

A - ORGANIZATION OF COMPONENTS



Notes:

1. C.O.'s Quarters may at times serve as Administrative Office, Communications Room, shelter for important Command Post personnel, etc.

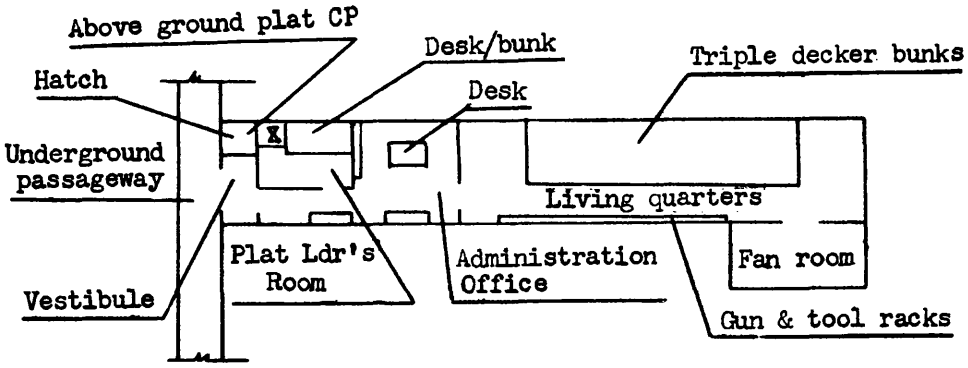
2. For reasons of hygiene, latrine should be set apart from other facilities.

3. At the front lines, folding bunks, for off-duty officers, will be installed at one side of the Ready Room; other furnishings to be of light construction.

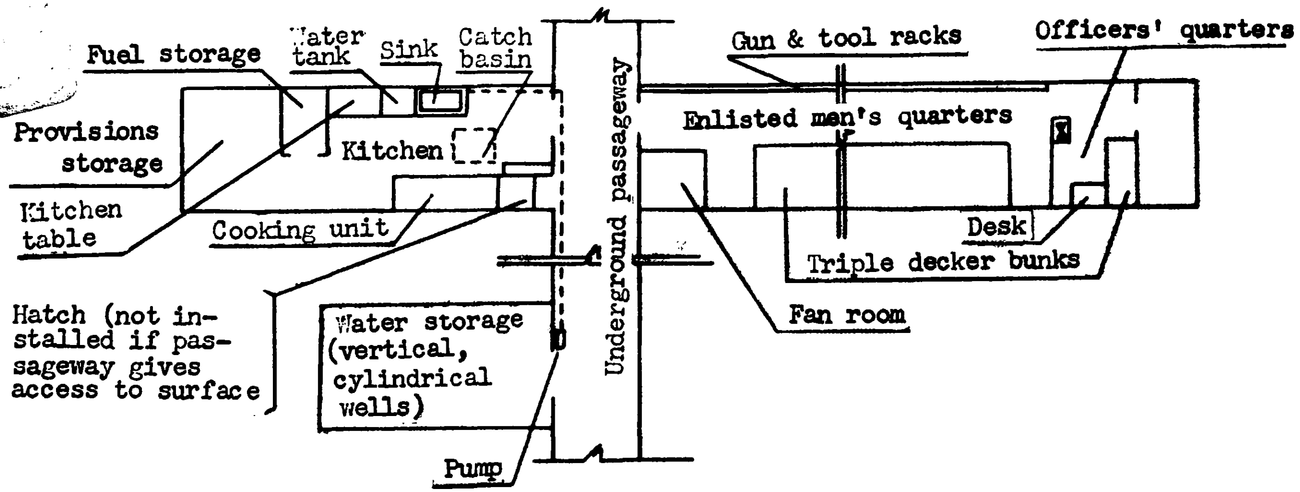
XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY UNDERGROUND SHELTERS FOR PERSONNEL (Continued)

B - LAYOUTS OF LIVING QUARTERS (CAVE-TYPE)

FOR PLATOON



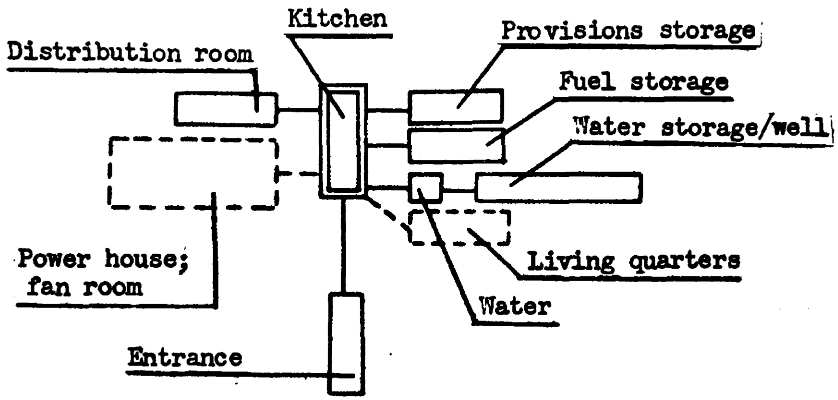
FOR COMPANY



XXVI – LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

UNDERGROUND SHELTERS FOR PERSONNEL (Continued)

C – ORGANIZATION OF COMPONENTS

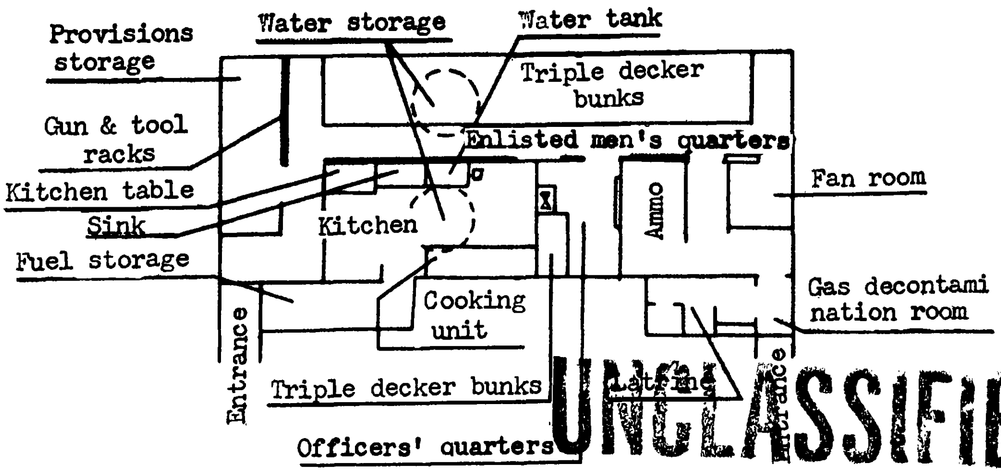


Notes:

1. Tables for preparing food, ranges and sinks needed for kitchen.
2. Electricity, fuel oil, charcoal, etc., used for heating.
3. Small number of men may prepare food on braziers near the exits. Provision to be made for storage of provisions, fuel and water.

D – LAYOUT OF LIVING QUARTERS (CUT-AND-COVER)

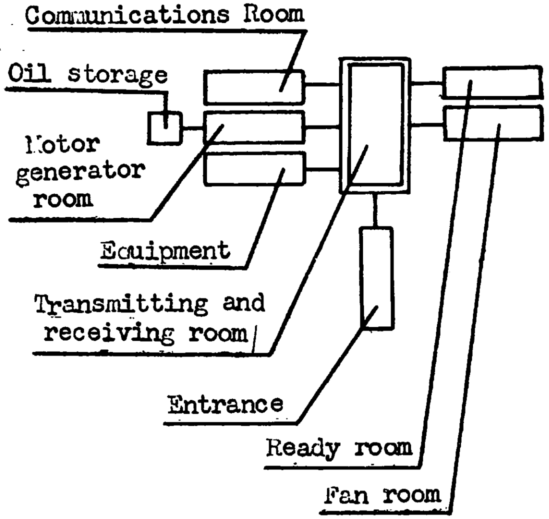
FOR COMPANY



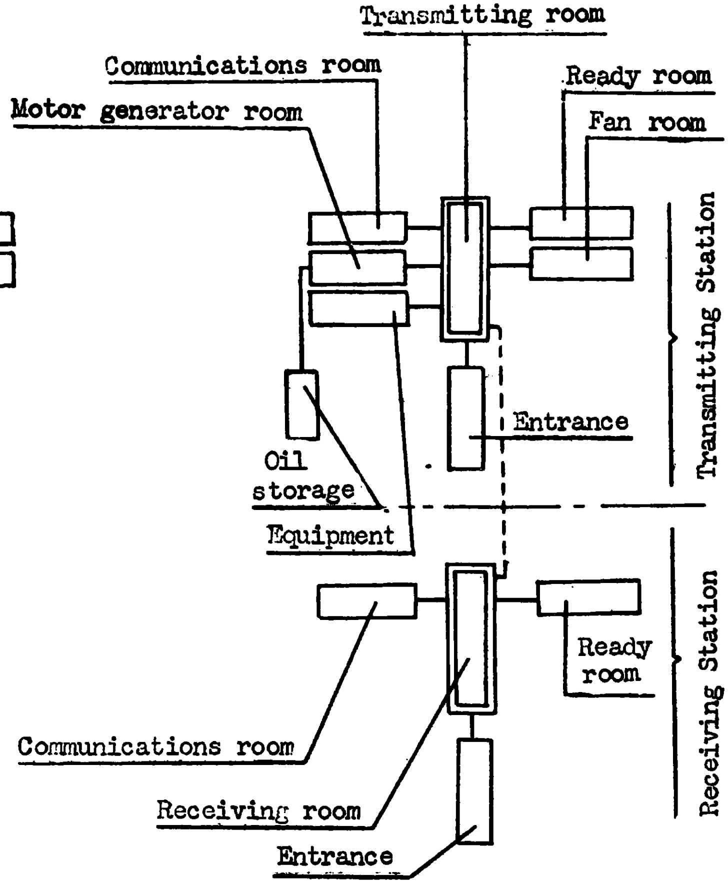
XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY RADIO STATIONS

A - ORGANIZATION OF COMPONENTS

WHEN TRANSMITTER AND RECEIVER ARE HOUSED IN SAME UNIT



WHEN TRANSMITTER AND RECEIVER ARE HOUSED INDEPENDENTLY

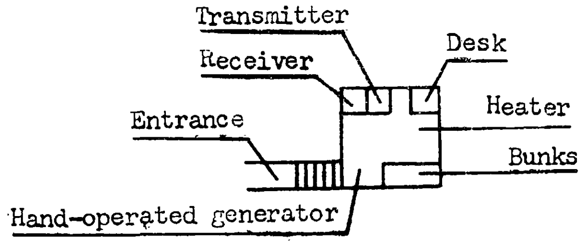


XXVI - LAYOUTS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

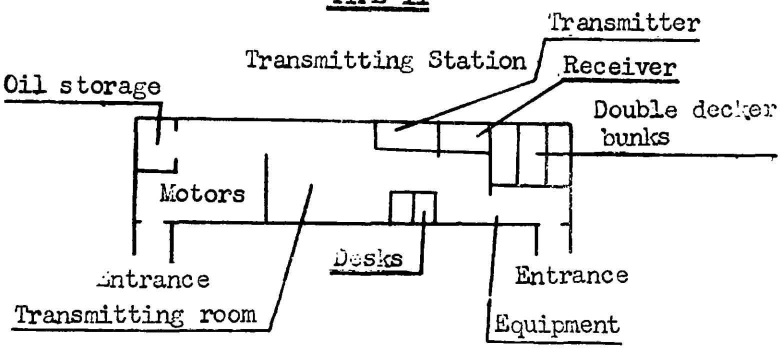
RADIO STATIONS (Continued)

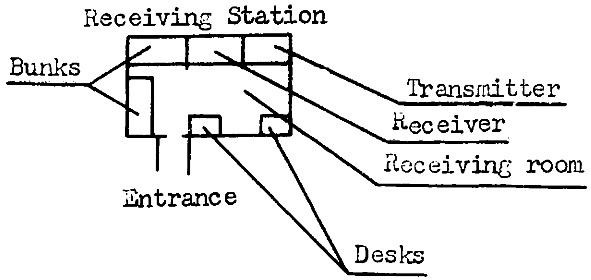
B - LAYOUT

TYPE I



TYPE II





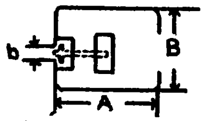
1. Facilities for small-model radio gear; may be used simultaneously as Communications room.
2. Facilities for large-model radio gear, separate transmitting and receiving stations may be used simultaneously as Communications room.

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

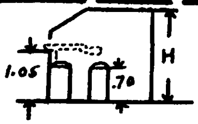
FIRING ROOMS

A - LIGHT MACHINE GUN

PLAN CROSS SECTION



ELEVATION CROSS SECTION

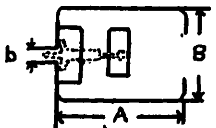


LINE OF FIRE SPECIFICATIONS

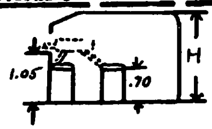
	30°	45°	60°
A	2.00	2.00	2.00
B	1.70	1.90	2.10
H	1.80	1.80	1.80
b	.10	.20	.25

B - HEAVY MACHINE GUN

PLAN CROSS SECTION



ELEVATION CROSS SECTION



LINE OF FIRE SPECIFICATIONS

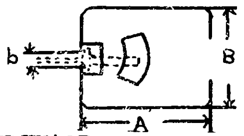
	30°	45°	60°
A	2.50	2.50	2.50
B	1.80	2.00	2.20
H	1.80	1.80	1.80
b	.30	.40	.60

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

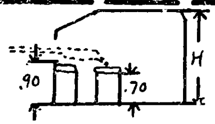
FIRING ROOMS (Continued)

C - TYPE 97 AUTOMATIC GUN

PLAN CROSS SECTION



ELEVATION CROSS SECTION



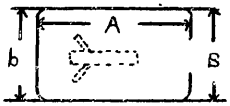
LINE OF FIRE SPECIFICATIONS

	30°	45°	60°
A	2.50	2.50	2.50
B	1.90	2.20	2.40
H	1.80	1.80	1.80
b	.25	.30	.40

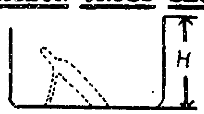
D - TYPE 94 LIGHT MORTAR

LINE OF FIRE SPECIFICATIONS

PLAN CROSS SECTION



ELEVATION CROSS SECTION

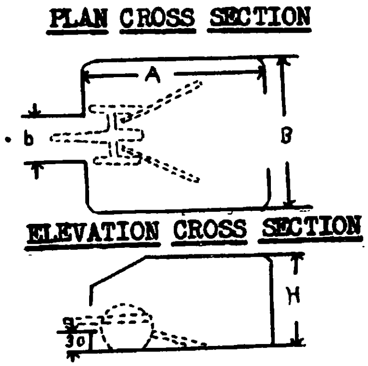


	30°	45°	60°
A	3.00	3.00	3.00
B	1.80	2.10	2.40
H	1.80	1.80	1.80
b	1.80	2.10	2.40

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

FIRING ROOMS (Continued)

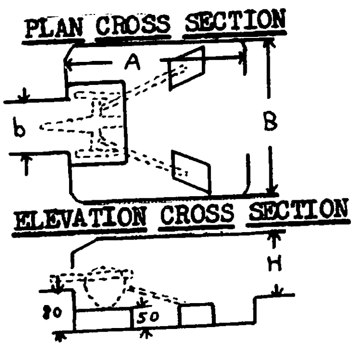
E - TYPE 94 37mm GUN
47mm GUN



LINE OF FIRE SPECIFICATIONS

		30°	45°	60°
A	37mm	3.40	3.40	3.40
	47mm	3.80	3.80	3.80
B	37mm	3.00	3.00	3.00
	47mm	4.50	4.50	4.50
H	37mm	1.80	1.80	1.80
	47mm	1.80	1.80	1.80
b	37mm	.90	1.10	1.30
	47mm	.90	1.10	1.30

LAYOUT OF ABOVE



LINE OF FIRE SPECIFICATIONS

	30°	45°	60°
H	1.30	1.30	1.30

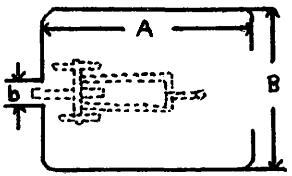
XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

FIRING ROOMS (Continued)

F - TYPE 41 MOUNTAIN GUN

Taking Line Of Fire With Muzzle As Axis

PLAN CROSS SECTION

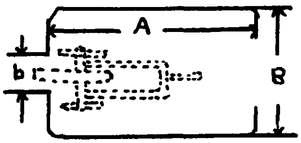


LINE OF FIRE SPECIFICATIONS

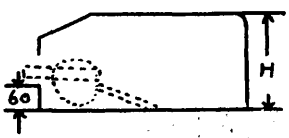
	30°	45°	60°
A	4.50	4.50	4.50
B	3.50	4.20	4.80
H	1.80	1.80	1.80
b	.40	.40	.40

Taking Line Of Fire With Axle As Axis

PLAN CROSS SECTION



ELEVATION CROSS SECTION



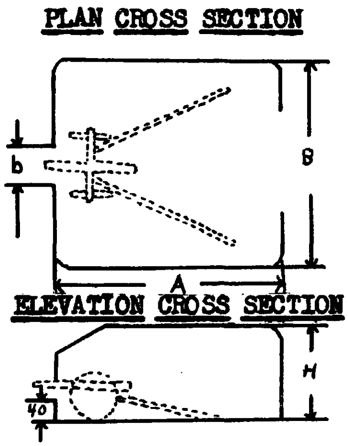
LINE OF FIRE SPECIFICATIONS

	30°	45°	60°
A	4.10	4.10	4.10
B	2.50	2.80	3.20
H	1.80	1.80	1.80
b	.80	1.00	1.20

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY FIRING ROOMS (Continued)

G - TYPE 94 MOUNTAIN GUN

Taking Line Of Fire With Axle As Axis

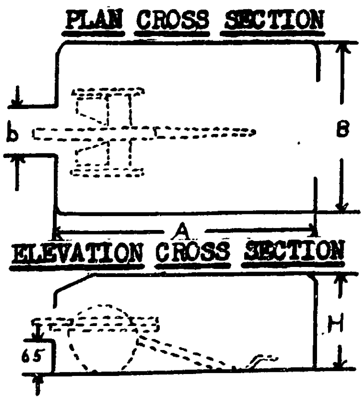


LINE OF FIRE SPECIFICATIONS

	30°	45°	60°
A	4.30	4.30	4.30
B	4.00	4.20	4.80
H	1.80	1.80	1.80
b	.70	.85	1.10

H - TYPE 38 FIELD GUN
IMPROVED TYPE 38 FIELD GUN

Taking Line Of Fire With Axle As Axis



LINE OF FIRE SPECIFICATIONS

TYPE 38 FIELD GUN

	30°	45°	60°
A	4.80	4.80	4.80
B	3.20	3.70	4.20
H	1.80	1.80	1.80
b	.90	1.30	1.65

LINE OF FIRE SPECIFICATIONS

MODIFIED TYPE 38 FIELD GUN

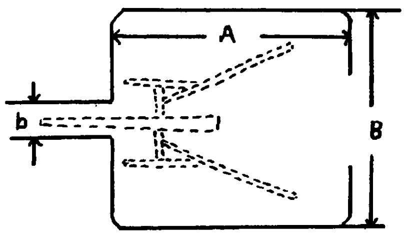
	30°	45°	60°
A	5.40	5.40	[illegible]
B	3.50	4.10	4.60
H	1.80	1.80	1.80
b	.90	1.30	1.65

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

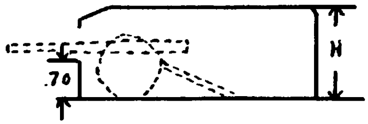
FIRING ROOMS (Continued)

I - TYPE 90 FIELD GUN

PLAN CROSS SECTION



ELEVATION CROSS SECTION



LINE OF FIRE SPECIFICATIONS

	30°	45°	60°
A	4.70	4.70	4.70
B	4.20	4.20	4.20
H	1.80	1.80	1.80
b	.73	.99	1.25

Notes:

1. Within these emplacements, have as few men as possible on the firing crew of each gun; make sure that they know by heart the essential points which govern the operation of the gun and its specifications.

Gun	Firing Crew
LMG	3
MG	4
Light Trench Mortar	5
Inf Bn Gun	5
Anti-tank Gun	5
Mt Gun	6
Fd Gun	6

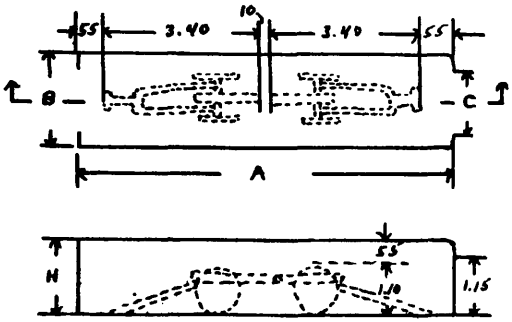
2. The dimensions for the inside of the emplacement should allow 5cm space in order to reduce noise.

3. The construction of the firing port and embrasure, and specifications for each gun, are separately shown.

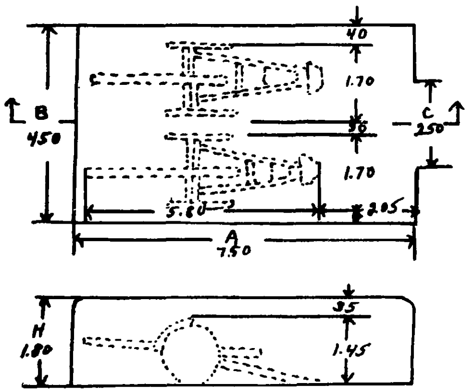
XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

READY SHELTERS

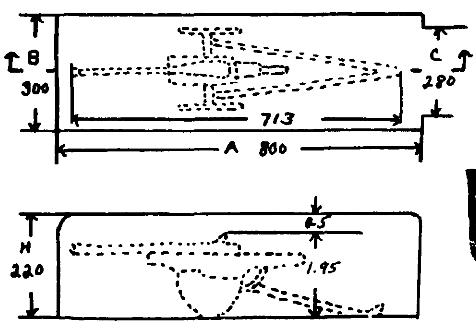
A - HOUSING TYPE 41 MOUNTAIN GUN



B - HOUSING TYPE 90 FIELD GUN



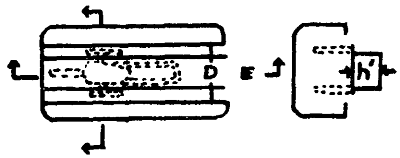
C - HOUSING TYPE 96 15cm HOWITZER

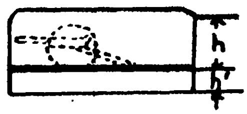


XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

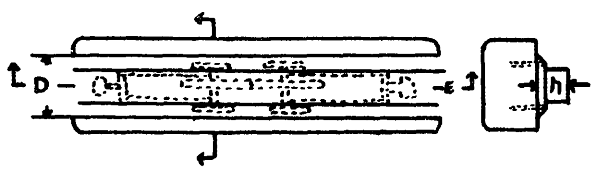
READY SHELTERS (Continued)

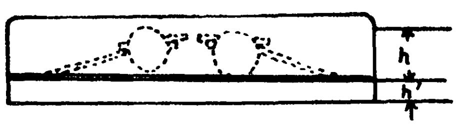
D - HOUSING TYPE 94 37mm ANTI-TANK GUN





E - SPECIAL CONSTRUCTION HOUSING TYPE 41 MOUNTAIN GUN





(These represent a special construction which serves to lower the cover of the shelter and offer as small a target to the enemy as possible.)

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

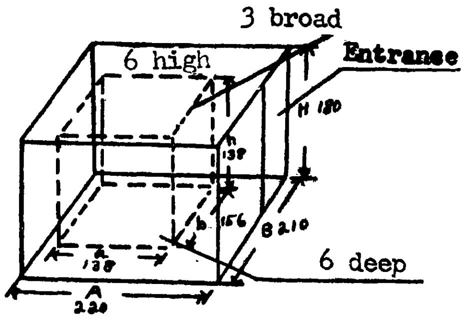
READY SHELTERS (Continued)

F - TABLE OF STANDARD DIMENSIONS FOR READY SHELTERS

Type of Gun Housed		Normal Construction (Measurements in cm)				Special Construction (Measurements in cm)			
		A	B	C	H	D	E	h	h'
Type 92 MG	2	350	200	100	165				
	3	350	300	150	165				
Type 92 Inf Bn Gun	1	270	150	120	165	110	50	85	95
	2	540	150	120	165				
	2	320	250	140	165				
Type 94 37mm AT Gun	1	400	100	150	165	140	70	102	78
	2	700	100	150	165				
	2	500	310	170	165				
47mm AT Gun	1	600	250	200	165	190	130	125	55
	2	1100	250	200	165				
	2	700	450	250	165				
Type 41 Mt Gun	1	450	200	150	165	140	70	115	65
	2	800	200	150	165				
	2	500	360	180	165				
Type 90 Fd Gun	1	650	250	200	180	190	110	150	30
	2	1200	250	200	180				
	2	750	450	250	180				
Type 92 10cm Cannon	1	900	290	250	210				
	2	1800	290	250	210				
	2	1100	500	270	210				
Type 91 10cm Howitzer	1	550	260	230	190				
	2	1000	260	230	190				
	2	650	500	250	190				
Type 96 15cm Howitzer	1	800	300	280	220				
	2	1600	300	280	220				
	2	900	520	300	220				

G - READY MAGAZINE

(EXAMPLE: FOR MG AMMO)



DIMENSIONS (In cm)

Width of entrance corridor.....70
Width of side corridor.........40
Outer circumference (TN:?).....10
Ceiling........................30
Floor sleepers.................10

/See following page for Table of Standard Dimensions for Ready Magazines for other types ammo./

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

READY SHELTERS (Continued)

H - TABLE OF STANDARD DIMENSIONS FOR READY MAGAZINES

Type of Ammo	No. of Rounds	No. of Boxes	Method of Stacking			Stacking Dimensions			Interior Dimensions		
			Deep	Broad	High	a	b	h	A	B	H
LG Ammo	20,000	14	3	1	5	66	76	135	140	130	180
MG Ammo	60,000	100	6	3	6	138	156	138	220	210	180
92 Inf Gun HE Shell, Fixed	400	50	5	2	5	210	102	150	200	150	180
92 Anti-tank Gun AP Shell, Fixed	600	20	4	1	5	140	73	140	210	120	180
Light Trench Mortar HE Shell	160	80	6	2	7	216	144	140	300	200	170
41 Mt Gun HE Shell, Fixed	400	100	7	3	5	231	216	160	320	270	180
90 Fd Gun (same)	600	150	10	3	5	330	267	160	420	320	180
91 10 Howitzer (same)	300	(x)150 (▭) 30	4) 4)	6) 2)	6) 4)	246) 316)	252) 74)	144) 128)	360	380	180
92 10 Cannon (same)	250	(x)126 (▭) 63	7) 8)	3) 2)	6) 4)	280) [illegible]	198) 186)	144) [illegible]	[illegible]	[illegible]	[illegible]
4 15 Howitzer (same)	240	(x)240 (▭) 24	12) 3)	4) 2)	5) 4)	[illegible] 294)	[illegible] 80)	140) 134)	420	450	180

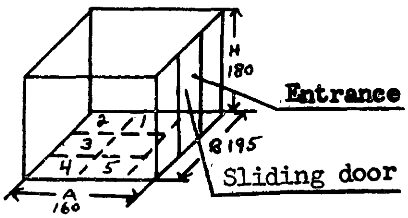
Note: (x) indicates Projectile; (▭) indicates Shell Case.

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

READY SHELTERS (Continued)

I - READY ROOMS

(EXAMPLE: FOR 5 MEN)



Space for each man - 65 sq cm

Entrance corridor 30-60 wide

J - TABLE OF STANDARD DIMENSIONS FOR READY ROOMS

INTERIOR DIMENSIONS

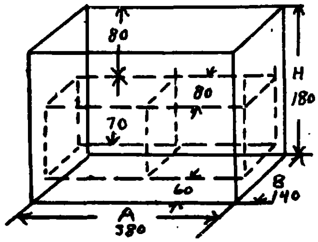
No. of Men	A	B	H
3	130	130	180
4	160	160	180
5	160	195	180
6	160	225	180
7	195	225	180
8	160	295	180

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

READY SHELTERS (Continued)

K - BUNK ROOMS

(EXAMPLE: FOR 4 MEN)



Bunk space for each man - 190 x 80

Entrance corridor 60-100 wide

L - TABLE OF STANDARD DIMENSIONS FOR BUNK ROOMS

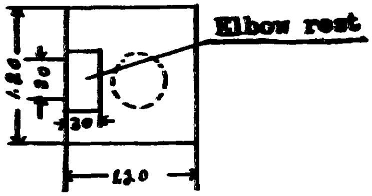
INTERIOR DIMENSIONS

No. of Men	A	B	H
4	380	140	180
12	600	220	180
20	600	330	180
50	1,100	450	180

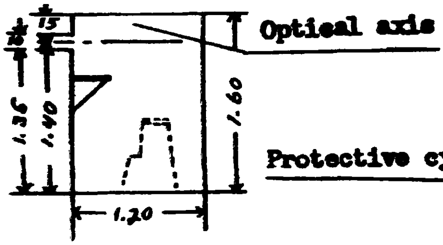
XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY OBSERVATION ROOMS

A - HOUSING BINOCULARS

PLAN CROSS SECTION

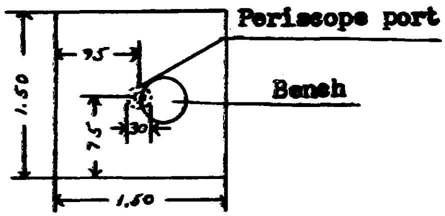


ELEVATION CROSS SECTION

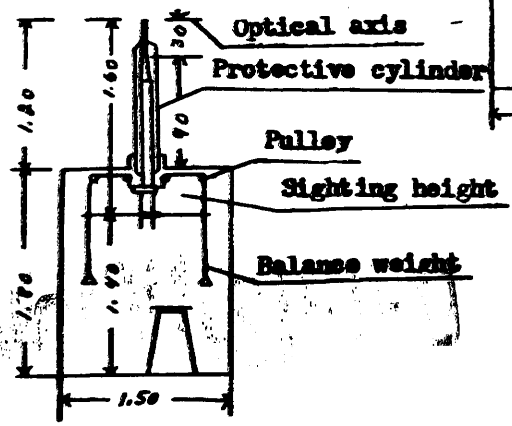


B - HOUSING SMALL PERISCOPE

PLAN CROSS SECTION

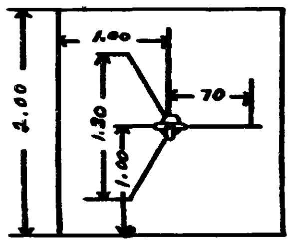


ELEVATION CROSS SECTION

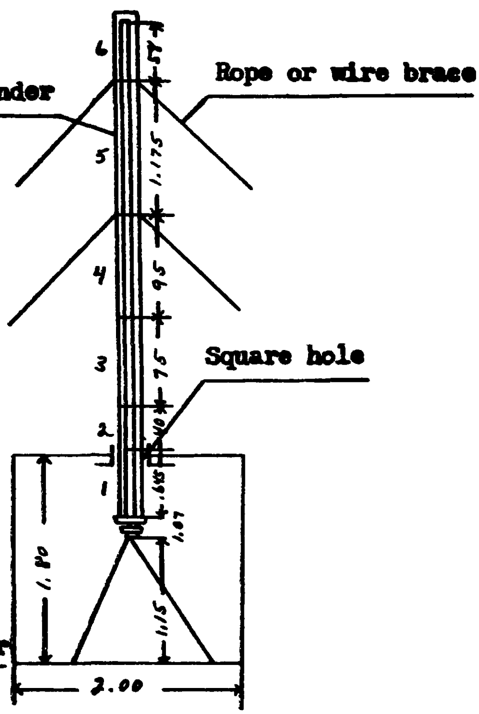


C - HOUSING 6m OBSERVATION GLASS

PLAN CROSS SECTION



ELEVATION CROSS SECTION



Collimators 1, 2, 3, 4 are adjustable for height and are removable

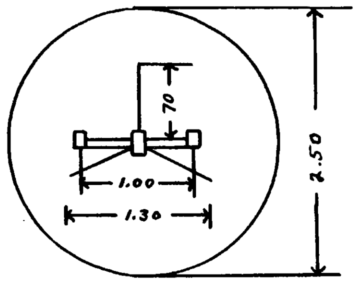
XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

OBSERVATION ROOMS (Continued)

D - HOUSING 8th YEAR TYPE HEAVY RANGE FINDER

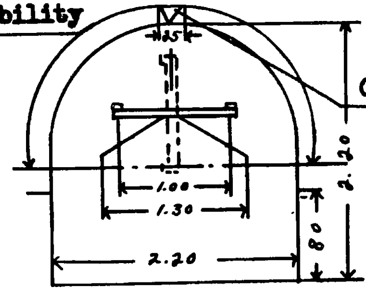
UNCOVERED

PLAN CROSS SECTION

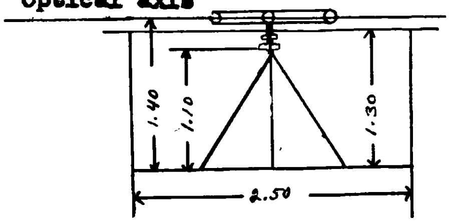


COVERED

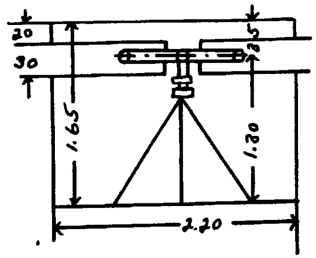
PLAN CROSS SECTION



ELEVATION CROSS SECTION



ELEVATION CROSS SECTION



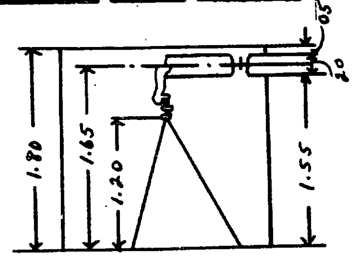
When in upright position, sighting height is 1m 30 - 1m 40.

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

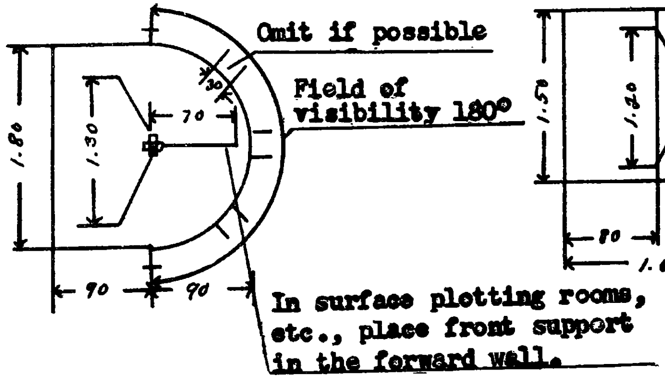
OBSERVATION ROOMS (Continued)

E - HOUSING TYPE 93 BATTERY TELESCOPE

ELEVATION CROSS SECTION

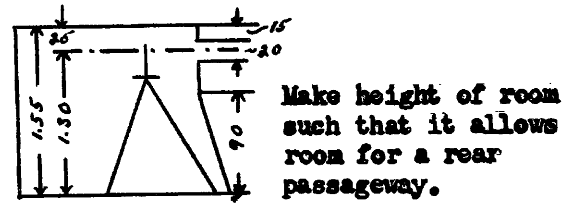


PLAN CROSS SECTION



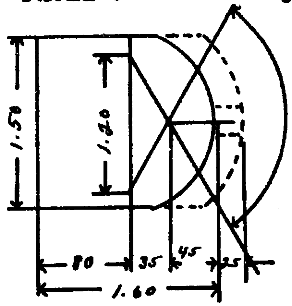
F - SURFACE PLOTTING ROOM

ELEVATION CROSS SECTION



PLAN CROSS SECTION

Field of visibility 120°

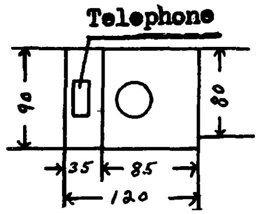


XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

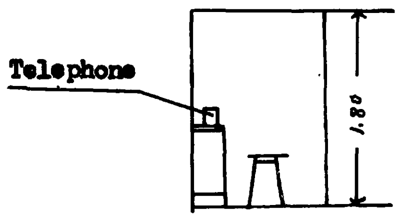
COMMUNICATIONS ROOMS

A - TELEPHONE ROOM (HOUSING TYPE 92 TELEPHONE)

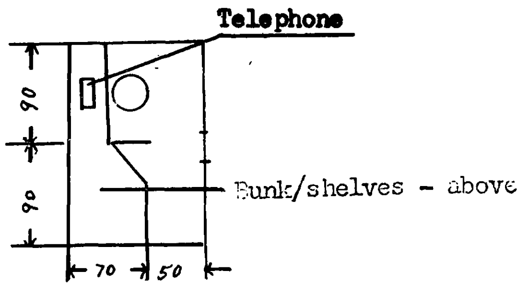
PLAN CROSS SECTION
FOR ONE MAN



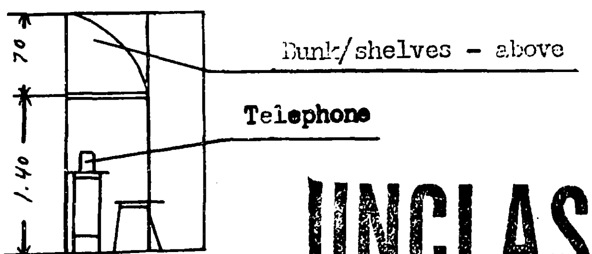
ELEVATION CROSS SECTION



PLAN CROSS SECTION
FOR TWO MEN



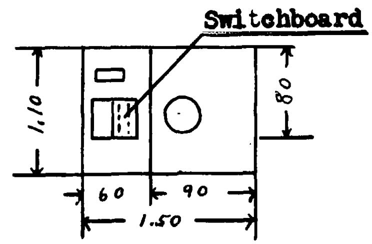
ELEVATION CROSS SECTION



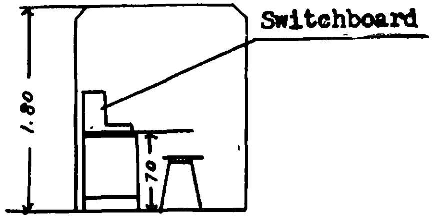
XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY COMMUNICATIONS ROOMS (Continued)

B - SWITCHBOARD ROOM (8 & 12 CIRCUITS)

PLAN CROSS SECTION

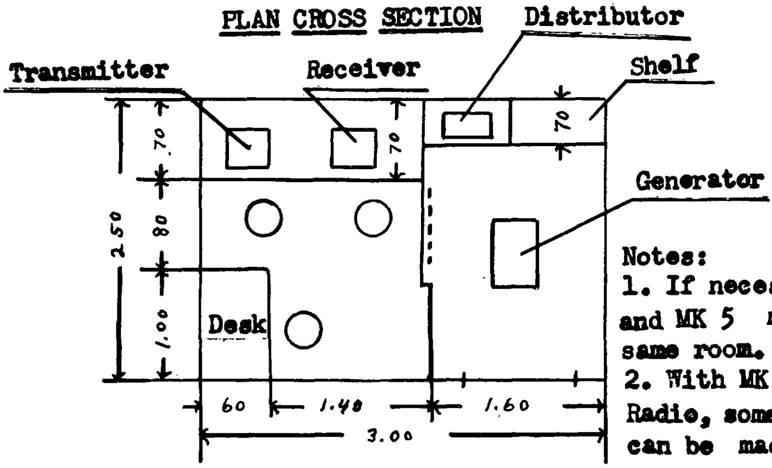


ELEVATION CROSS SECTION



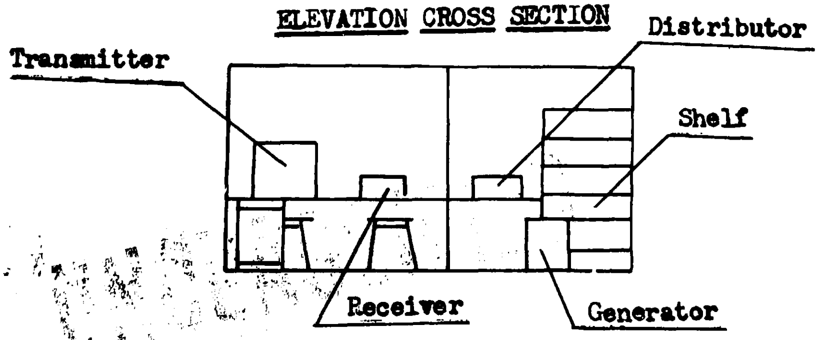
C - RADIO ROOM (HOUSING TYPE 94 (B) RADIO, MARKS 2, 3, 5)

PLAN CROSS SECTION



Notes:
1. If necessary MK 3 and MK 5 may be in the same room.
2. With MK 3 and MK 5 Radio, some measurements can be made smaller.

ELEVATION CROSS SECTION

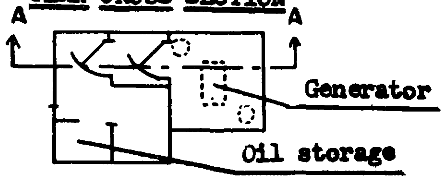


XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

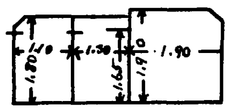
POWER PLANT

A - HOUSING 1kw GENERATOR

PLAN CROSS SECTION

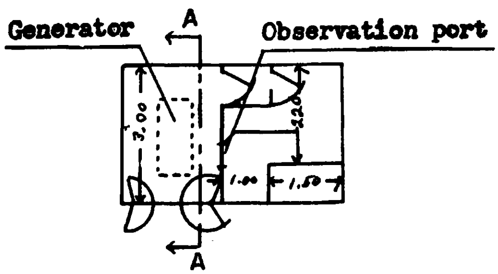


SECTION A-A

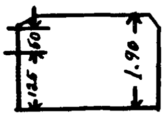


B - HOUSING 5kw GENERATOR

PLAN CROSS SECTION



SECTION A-A

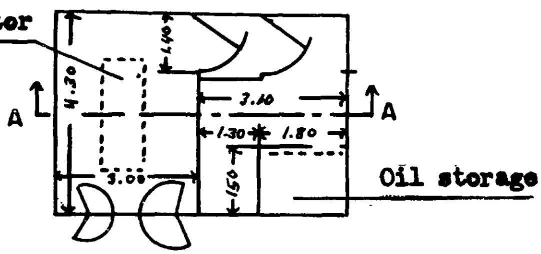


XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

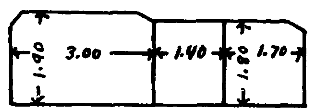
POWER PLANT (Continued)

C - HOUSING 10kw GENERATOR

PLAN CROSS SECTION

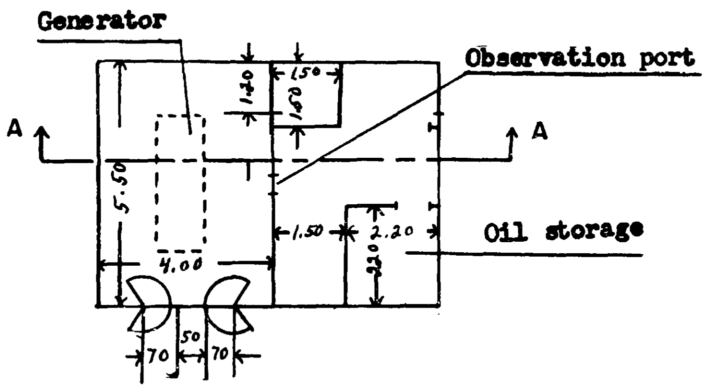


SECTION A-A

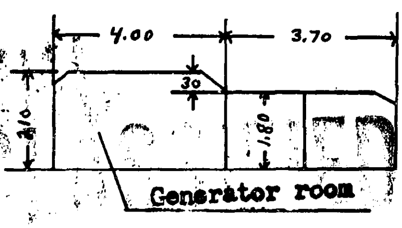


D - HOUSING 20kw GENERATOR

PLAN CROSS SECTION



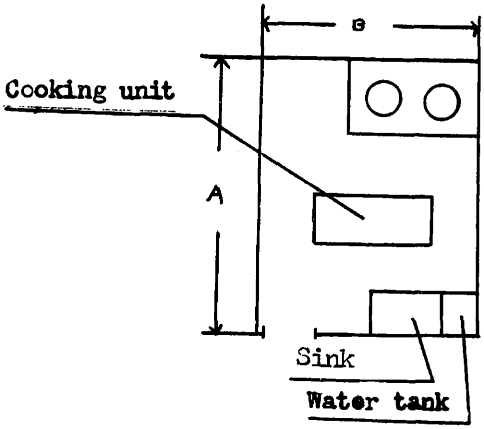
SECTION A-A



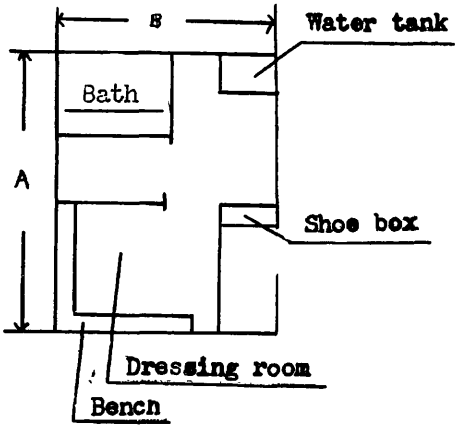
XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

LIVING QUARTERS

A - KITCHEN



B - BATH HOUSE



C - TABLE OF STANDARD DIMENSIONS FOR VARIOUS UNITS COMPRISING LIVING QUARTERS

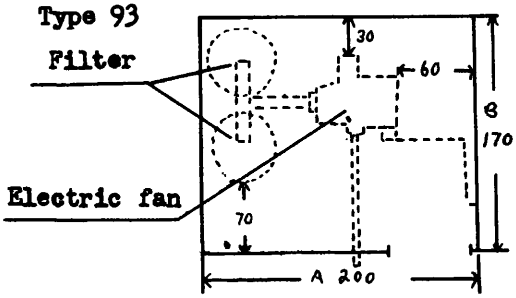
Unit	No. Men	A	B	H
Kitchen	50	450	360	250
	100	450	600	250
Provisions Storage	50	270	270	250
	100	360	360	250
Bath House	50	450	360	250
	100	450	450	250
Wood and Coal Storage	50	200	200	200
	10[illegible]	[illegible]50	250	250
Ash Disposal	5[illegible]	[illegible]50	1[illegible]0	15[illegible]
	10[illegible]	200	2[illegible]0	20[illegible]
Cooks' Quarters	50			
	100	270	270	250

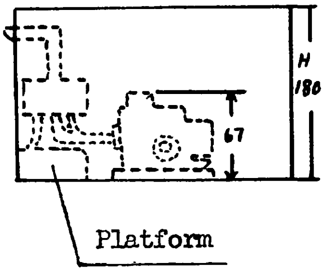
XXVII STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

MISCELLANEOUS

A - FAN ROOM

(EXAMPLE: HOUSING TYPE 93 ELECTRIC FAN)





B - TABLE OF STANDARD DIMENSIONS FOR FAN ROOMS

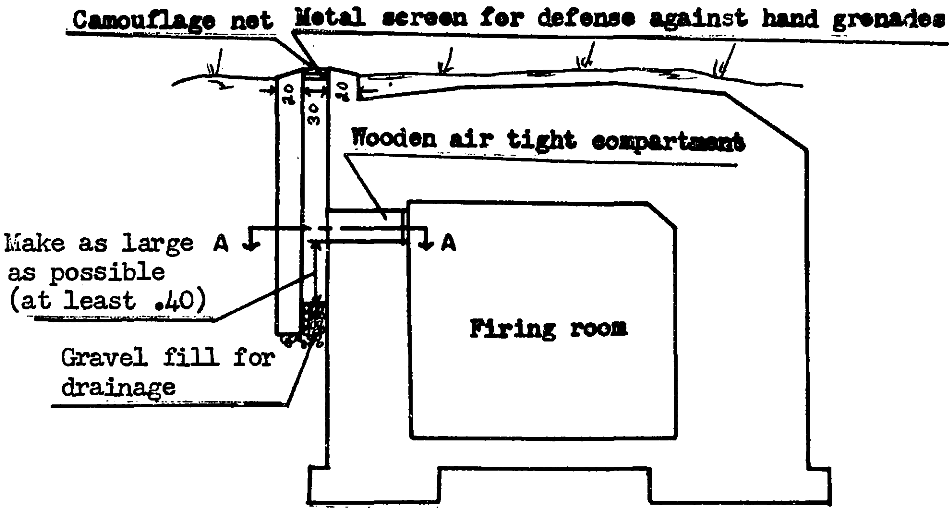
Type Housed	A	B	H
Type 93 Hand-Operated Fan	180	170	180
Type 93 Electric Fan	200	170	180
Electric Experimental Fan	620	260	250

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

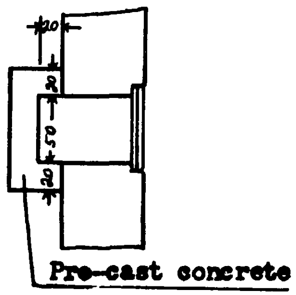
MISCELLANEOUS (Continued)

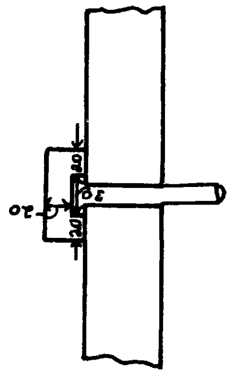
C - AIR VENT
(FIRING ROOM IN CASEMATE)

ELEVATION CROSS SECTION



SECTION A-A (WHERE CONCEALMENT IS IMPORTANT)





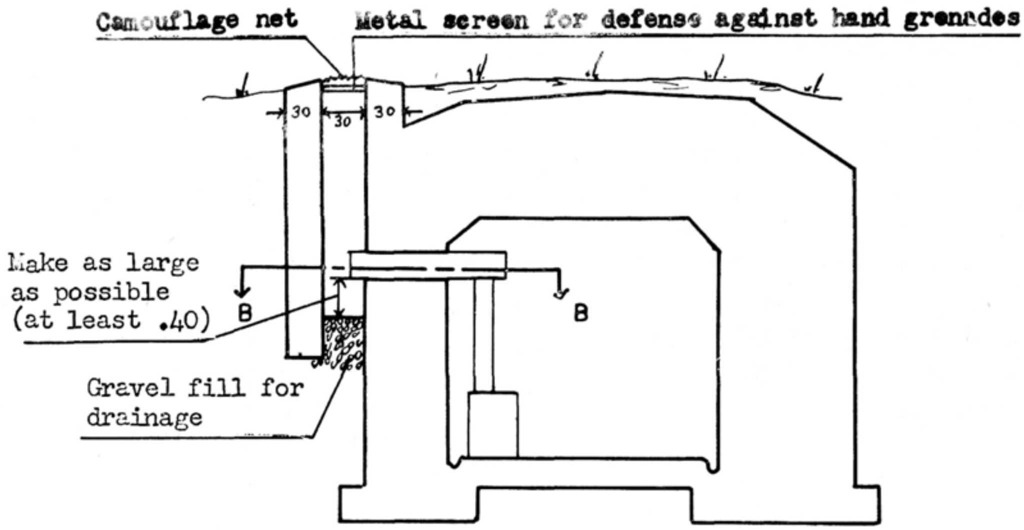
1. The elevation cross section is a cross section of the air vent used by a gun casemate firing room.
2. This diagram illustrates the construction of the air vent generally used by a casemate which of necessity is concealed.

XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

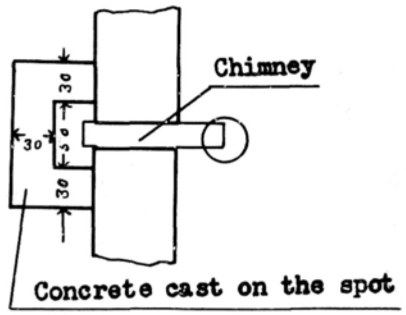
MISCELLANEOUS (Continued)

D - CHIMNEY
(WHEN NEED FOR CONCEALMENT IS GREAT)

ELEVATION CROSS SECTION



SECTION B-B

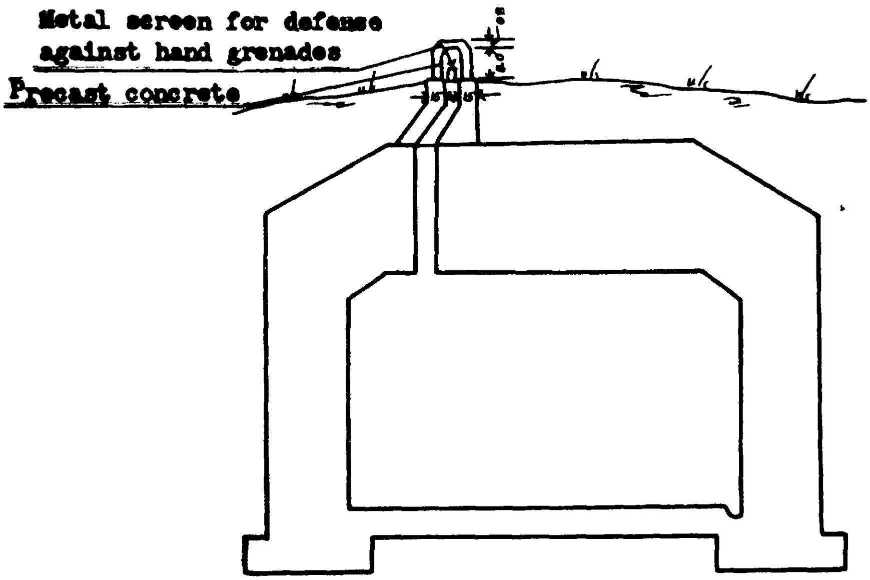


XXVII - STANDARD DIMENSIONS OF DELIBERATE FORTIFICATIONS FOR INFANTRY AND ARTILLERY

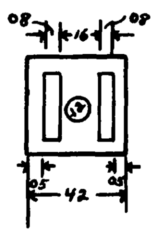
MISCELLANEOUS (Continued)

E - AIR VENT/CHIMNEY
(WHEN NEED FOR CONCEALMENT IS RELATIVELY SMALL)

ELEVATION CROSS SECTION



CROSS SECTION



Notes:

1. Air vent for gun casemate firing room serves the purpose of expelling carbom monoxide gases; it is installed in LMG, HMG, field gun, mt gun. and rapid-fire gun casemates.

2. Plans of the generally used air intake and air exhaust shafts are determined by their respective purposes.